THE
METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW

Vol. 27 NEW YORK, JANUARY, 1929 No. 1

New Rolling Mill Waste Recovery Plant

A Description of the New Reclamation Plant of the Chase Metal Works, Waterville, Conn.

By F. A. WESTBROOK
Mechanical Engineer

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

CHASE METAL WORKS, Division of Chase Companies, Inc., located at Waterville, Conn., have recently placed in operation a brass reclaiming plant which has resulted in considerable economies and the recovery of large quantities of usable materials. To be specific, the actual materials salvaged amount in the average month to the following round figures:

25,000 lbs. No. 1 brass, hand picked at grizzly.
150,000 lbs. No. 2 brass, from the jigs, ball mill, etc.,
240,000 lbs. No. 3 brass, from the concentrating tables,
7,500 lbs. No. 1 egg coal,
50,000 lbs. charcoal.

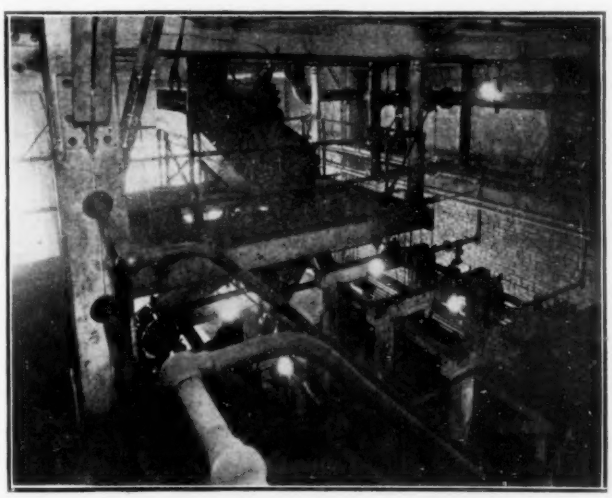
This material is obtained from the following sources:

(1) Skimmings from the electrical furnaces.
(2) Drippings or spills from electrical furnaces.
(3) Ashes from crucible fires.
(4) Mould pits cleanings from the hand fired furnaces.
(5) Ashes from sand casting shop.
(6) Rubbish burner ashes.
(7) Sweepings from all over the plant.
(8) Furnace linings and chippings and pots from hand fires.

All of this is collected in trucks and hauled to the reclamation plant by storage battery "jitneys." The materials from the furnace linings and the pots from the hand fires (8) are crushed in a small jaw crusher. This, on account of its weight, and the ashes from the rubbish burners, on account of nails, wire and so forth contained in it, are kept separate. The other material is then dumped and raked over a grizzly. The large pieces of coal and brass which do not pass through are picked out by hand and placed in separate piles. Rubbish is thrown to one side.

The refuse which passes through the grizzly is carried up to a storage tank by an elevator. From this it is fed to a three section Hum-mer vibrating screen which separates it into four sizes. The coarse material passes directly to a ball mill. The next to a bull jig, the third to a small jig and the smallest size direct to the concentrating tables.

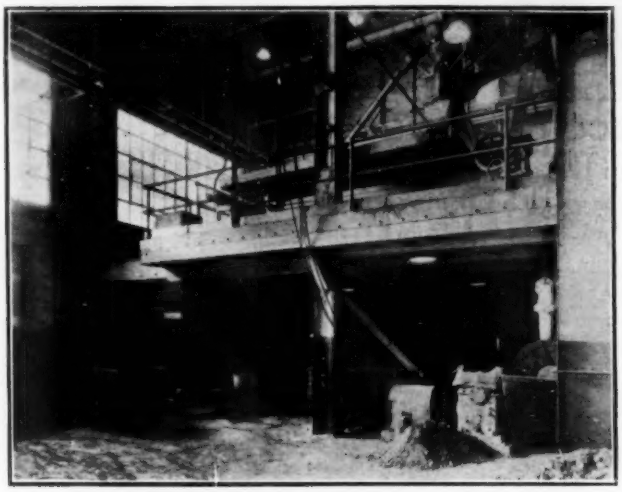
Each jig has two compartments and three products are obtained from each compartment of each jig. Let us first consider the bull jig. In the first compartment the overflow, brass, charcoal, slag, etc., goes into the second compartment. The gate product consisting of clean brass goes to a revolving dewatering screen, the coarse brass dropping to a belt conveyor leading to the dryer. The water and any fine brass go to a launder discharging into a sand pump which feeds to a dewatering cone. This cone discharges into a feed box with split feed to two concentrating tables. The "hutch" or third product from the first compartment of the bull jig consists of the fine material coming through the screen and settling to the bottom. This is washed into a cone from which it passes



VIBRATING SCREEN AND UPPER PART OF JIGS

into the same sand pump and sequence of operations as already described.

In the second compartment of the bull jig the overflow, consisting of charcoal and fine dirt, is washed into the

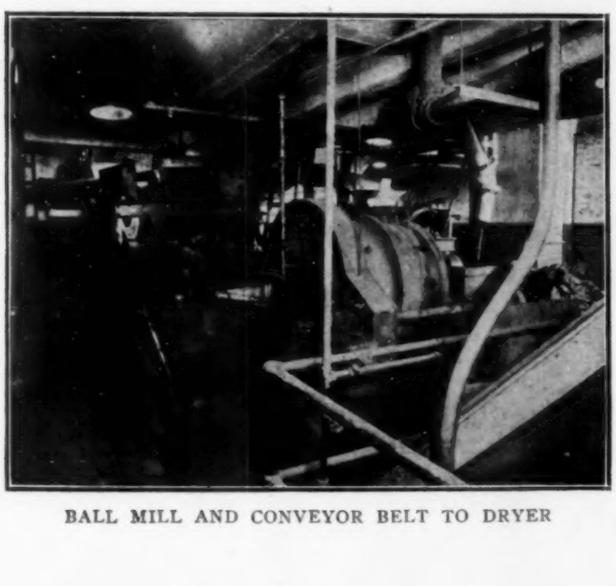


DEWATERING CONE, TABLES AND BALL MILL DRIVE

Trommel screen to separate the coarse charcoal from the dirt and water which pass through the mesh and run off into the river. The charcoal passes into a storage tank. The gate product from this compartment goes to a launder and then to a second Trommel from which the coarse material is discharged into the ball mill and the fines to the same launder followed by the same sequence of operations as the fines from gate product from the first compartment. The "hutch" product from the second compartment is handled in exactly the same way and by the same equipment as that from the first compartment.

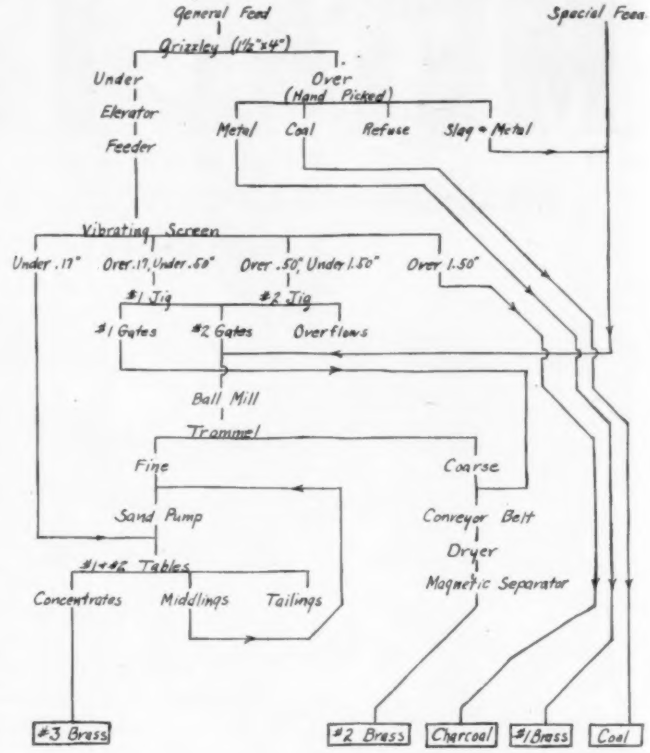
In the case of the small jig the products from the two compartments pass through the same sequences in the same machines as those from the bull jig.

The ball mill crushes the coarser sizes which enter it, as described, so that the brass may be separated from the other materials. The electric furnace linings and chippings together with the pots from the hand fires which were crushed in the jaw crusher and the ashes from the rubbish burners, all of which were kept separate from the materials passing through the processes so far described, are placed directly in this ball mill for further reduction in sizes. They are too near the same specific gravity as brass to go through the jigs. The crushed product washes out of the ball mill through a screen at the end. Here



BALL MILL AND CONVEYOR BELT TO DRYER

the fine brass and dirt go into the launder, sand pump, dewatering cone, split feed box and so to the concentrating tables as already described. The coarse material, which

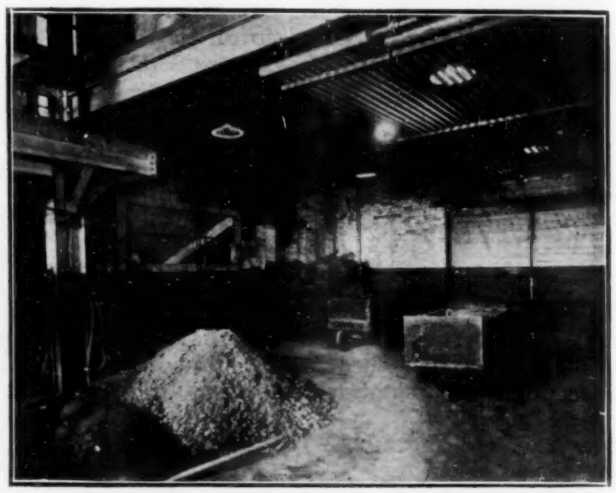


FLOW SHEET SHOWING ESSENTIAL FEATURES

Reclaiming Plant of Chase Metal Wks Div of Chase Cos. Inc

is clean brass, drops on to the belt conveyor leading to the dryer.

Three products are separated out at the concentrating tables. The first is dirt or tailings which are washed into the river. The second is a mixture of brass and dirt known as "middlings" which runs into the sand pump and so back to the tables. The third is the No. 3 brass which



CHARCOAL BIN, END OF DRYER, MAGNETIC SEPARATOR, AND BOX FOR CLEAN, DRY, IRON-FREE BRASS

runs off into settling tanks which dump into the storage space. This is smelted to recover the copper.

The dryer, into which the coarse material from the Trommel screens and the ball mill are discharged by the

belt conveyor already mentioned is of the revolving cylinder type and is fired with oil burners. At the end of the belt conveyor leading into this dryer there is a magnetic pulley to remove iron. The dried material is discharged on to another short belt conveyor also equipped with a magnetic pulley so as to obtain as complete a removal of iron as possible. The product is known as No. 2 brass and is discharged into trucks which are hauled by the "jitneys" to the casting shop.

This plant has been designed by D. K. Crampton, Metallurgist of the Company, for a capacity of 20 tons per day but it can be doubled, if necessary, by increasing the rate of feed. The machinery is such that this is entirely practicable.

Problems in Practical Foundry Work

By WILLIAM J. REARDON
Foundry Editor

Recovering Zinc from Galvanized Scrap

Q.—Will you please let us know if there is any way of recovering zinc from galvanized sheets that may be done commercially? We accumulate large quantities of light gauge galvanized scrap in small pieces, but we are unable to dispose of this to advantage.

A.—The zinc on galvanized scrap is recovered in one of two ways. Where the zinc coating is heavy, the scrap is placed in a bath of molten zinc which melts most of the coating. This is automatically added to the body of melted metal in the pot.

Another method is to distill off the zinc and catch the fumes in cloth bags located in a cooling chamber. These condensed fumes (in the form of a white powder), if pure enough, can be sold to paint manufacturers.


WILLIAM J. REARDON

Casting Thin Bronze Plates

Q.—We are casting two mixtures: 92 copper, 8 tin, with one-half pound of 5 per cent phosphor copper added to each No. 55 pot; and 95 copper, 5 tin with one-half pound of 15 per cent phosphor copper to each No. 55 pot.

Now, we have had no trouble in casting bars that were 4 by 4½ inches across and two or three feet long, but when we try to cast a plate an inch thick, 12 inches wide and about 3 feet long, we get into trouble. There is usually a series of small cracks near the middle, especially when we pour at as low a temperature as possible. When we pour at higher temperatures, we are very likely to get a plate that is drossy and spilly and which cannot even be scalped out. We have about 50 per cent of bad ones, either showing scabs, which are always near the center. It seems to us that there is shrinkage.

As to what we have tried as remedies, we have varied the phosphor content, gone over a wide range of pouring heats, poured vertical and at all angles down to nearly horizontal, put in phosphor about ten minutes before pulling the pot and varied this down to putting in the phosphor after pulling; we have tried pouring slowly and at all degrees of speed up to quite fast; we have tried using strainers.

We are using coal fired pits, salt, charcoal and borax fluxes; the metal is 80 per cent new, 20 per cent our own scrap.

A.—It is a difficult task to cast a slab of the dimensions you mention. We would suggest casting a little thicker and rolling out to the desired thinness and length. You seem to have covered the ground thoroughly in varying pouring temperatures and angles.

If you must have a slab 1 inch thick and 12 inches wide, we suggest that you pour with a strainer pouring cup the full width of the mold keeping the pouring cup full in casting. Heat the mold before pouring, and try placing the mold at a 90° angle before pouring. Since the 4 by 4½ bars come out good there is probably no fault in your melting practice.

Casting Practice

Q.—We are sending you two gates of castings. They have been giving us trouble, so please look them over and see if you can make any suggestions as to gating, melting, etc.

A.—On examination of these castings, we find on the base pattern the only trouble is shrinkage. This can be overcome by placing a chill made of the same metal in the mold. On the stem the casting runs dirty, due to the aluminum in the metal when lead is present; a large gate is necessary on such a casting. The ball runs clean as a light gate can be used.

We suggest that you eliminate the aluminum in the alloy and use 4 ozs. 10 per cent silicon copper. Add the silicon copper while the crucible is in the furnace, a few minutes before withdrawing the crucible, so as to allow the copper silicon to melt and became thoroughly incorporated in the molten metal. Stir well and add a tablespoonful of salt. Skim well and the metal is ready for casting. This should overcome the dirty appearance now in the casting.

Brass and Bronze Mixtures

Q.—I would greatly appreciate advice as to good yellow brass and bronze mixtures:

A.—A good yellow brass mixture for casting—one that is not hard to cast, is as follows: 70 copper, 26 zinc, 4 lead.

If casting has to be dipped, we suggest the following: 73 copper, 26 zinc, 1 lead.

For one that will give better results in casting, we suggest: 76 copper, 18 zinc, 5 lead, 1 tin.

For red brass, the standard mixture is: 85 copper, 5 tin, 5 zinc, 5 lead.

The Future of the Metal Industries

A Symposium on Developments and Changes to Be Expected in Various Fields

By A NUMBER OF SPECIALISTS

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

IT is the rule at this period of the year to review the progress of industry for the past twelve months. This rule we are keeping, elsewhere in this issue.

The year 1928 has been so unusual, however, as to call for something more than a recital of its accomplishments. It has been one of our great prosperous periods, at the same time showing a continuation of the tendency of falling prices.

Seldom has industry as a whole been in better condition. The questions confronting the industrial world to-day, are therefore, "How long will it last? How can we keep it?"

In the world of metals we have learned that one of the best ways to insure profits is to cut costs. Improved equipment, new methods, new processes—the demand for these will never cease.

But there may be basic and even revolutionary changes in addition. What will they be?

We have asked a number of prominent men in the field of metals, each a specialist in his own line, to give us his ideas of the future of his particular specialty. These are not mere figments of the imagination; they are the studied opinions of men of long experience. In such hands prophecy becomes more than guesswork. It is the logical conclusion of experience and knowledge. We venture to add a prophecy of our own to the effect that most of the forecasts given in this symposium will be realized in a surprisingly short time.

The Rolling Mill of the Future

By WILLIAM J. PETTIS

Rolling Mill Editor

BANKERS, financial writers, seers, disciples of disaster, and others are making their annual pilgrimage into the future, and telling the people, through the press, what to expect in the future, in general. And so being seized with the spirit of prophecy, we will endeavor to tell the brass man what to expect, in particular, in the line of progress, in his own special industry. Whether a decade or two will bring forth the change is not easy to answer. Over-enthusiasm, or too vivid an imagination, may predict too much, but in view of what has happened to other lines of industry, where many small units have been brought under one management there is no need for undue conservatism.

In Watson Davis' interesting book, "The Story of Copper," he makes a comparison of the speed of the reduction processes in winning copper from the ore. He says, "When ore had to be heap-roasted, and the matte repeatedly roasted in stalls, it took four months to achieve copper; now sulphide ore can be fed into the blast furnaces in the morning, the matte sent directly to the converter, blown into copper, and shipped as anodes in the evening,"—a reduction in time of from four months to about ten hours in the process of reducing copper ores. In view of this industrial miracle, critics of what can't be done, should tread softly.

We cite this instance as a wall of defense against any readers of this prophecy, who might form the opinion that with the writer the 18th Amendment was but a scrap of paper.

WILLIAM J. PETTIS

THE CASTING SHOP

Any discussion of a brass mill generally starts with the casting shop, so we will start by prophesying the brass mill casting shop out of existence. There won't be any. In the new order of things the casting shop will be an anomaly. A great copper mining company today is refining its copper and zinc practically side by side. An enormous amount of labor, and a high order of skill go into the process of producing commercially pure metals, with an appreciable loss of the metals, in the process. The copper is then poured into ingot molds, the zinc into slab molds, and they are then shipped to the brass mills to be used in making brass by alloying the two metals. In this process the same cycle is repeated, with the loss of metals in the melting process, the battle to prevent injurious gas-absorption and to expel any that may have got by. When said in dollars it is a lot. What will be done is that the alloying will take place at the source of supply. The refined copper in its molten state will be taken in such quantities as desired and placed in an auxiliary furnace, and the refined molten zinc added in such quantities as will make the alloy desired. The use of an auxiliary furnace will be necessary in order to bring the alloy to a proper pouring heat; mechanical equipment will make the handling of the metals an easy and rapid one. When the alloy is ready to pour it will be poured, not into the familiar iron molds making a bar of brass from one hundred to two hundred pounds in weight and one inch, to one and three-eighths inches in thickness, with the first scrap loss from gating and the second from over-hauling, after an initial operation, as has always been the process since the inception of the industry. The new process will

make a casting by the graduated cooling process. The molten metal will pass through an open end mold, made of some non-friction bearing material, and of such length as will allow the metal to solidify as it approaches the exit end. The propelling force will be either the pouring head, or it will be forced from the furnace directly into and through the mold by air pressure applied on top of the bath in a sealed furnace, the furnce being of the type using electric energy as the heating unit. The castings will be about one-half inch thick, and cover the range of widths demanded by the trade; the weight, limited only by the capacity of the furnace. The bars will be coiled as they leave the mold, and shipped in units of from five hundred pounds to one ton in weight.

Except for minor details that is about all we can do for the casting of the brass. The next step forward is in the rolling mill.

THE ROLLING MILL

In the mechanical construction of the rolls there is little to look forward to, except in some refinements in construction. The newest rolls either the "cluster" type, or the four high stands, are mounted on roller bearings and a set of rolls, with a crushing power of tons, can be turned over by hand, when idle.

The friction has been reduced to a minimum. The change will come in their arrangement and use. With the cast brass coming to the mills in units, weighing from five hundred pounds to one ton, the tandem mill system, will not only reach the high development it has already achieved in the steel mills, but will excel it. The annealing will take place between the roll stands, a continuous operation. It will be possible to finish a bar of brass in the lighter gauges in one pass through the series of tandem mills, resulting in a rapid turn-over of material and an enormous production.

Prof. William Lyon Phelps, in an article "The Truth in Fiction," published in the "Cleveland Plain Dealer," states among other things, "I believe that the average life of a scientific theory is about seven years." In this rapid industrial age it is safe to say that the life of any industrial theory will be a short one.

There will be a re-grouping of all the fabricating plants using brass or copper. Brass rolling mills will start reaching out towards the Pacific Ocean, locating at strategic points, and around these mills will be grouped all the fabricating plants in that territory. This will be an economic grouping, which will be reflected in saving that will put the finished article on the market at a price that will make substitutes for brass or copper have little appeal to the buyer.

The Spirit of Prophecy is passing, and this is as far as we can go.

Future Possibilities of the Tin Consuming Industries

By C. L. MANTELL

Consulting Engineer, Pratt Institute, Brooklyn, New York

THE major divisions of the tin consuming industries may be considered as tin and terne plate; the various alloys into which tin enters as an essential constituent, such as the solders, the babbitts and bearing metals, bronzes and brasses, the white metals, the printers' alloys, and minor applications; the products fabricated from tin metal itself by mechanical working, such as foils and tubes; the hot dipped products other than tin plate, ordinarily classed as tinware; the tin chemicals; and salts and metal used for tin plating.

The last five years have brought forth extended efforts in many directions to find substitutes for tin, to avoid the use of this metal, or to use less of it in those applications where it must be employed. This tendency has had many causes. There has been a great deal of propaganda as to regulation of the price of tin. Stories have been circulated attempting to convince one that the available supplies of tin in the shape of ores are being used up and will eventually, in the near future, be exhausted. Propaganda of long ago that tin production could not be greatly increased is exploded, for it has increased and there has been much progress in the technique. The working of alluvial deposits has been extended to leaner gravels, for with the improved dredging equipment and the use of gravel pumps facilitated by operations passing into strong hands with command of large amounts of capital, deposits averaging a half pound of tin per cubic yard are now workable, as against the former minimum of one and one half pounds per cubic yard. Another factor in the tendency to find substitutes has been the dissatisfaction at times with tin coated metals. Still another movement of importance has been due to the efforts of producers of other metals to broaden their markets. This has been particularly evident in the competition between tin and aluminum in the case of foils and tubes.

C. L. MANTELL

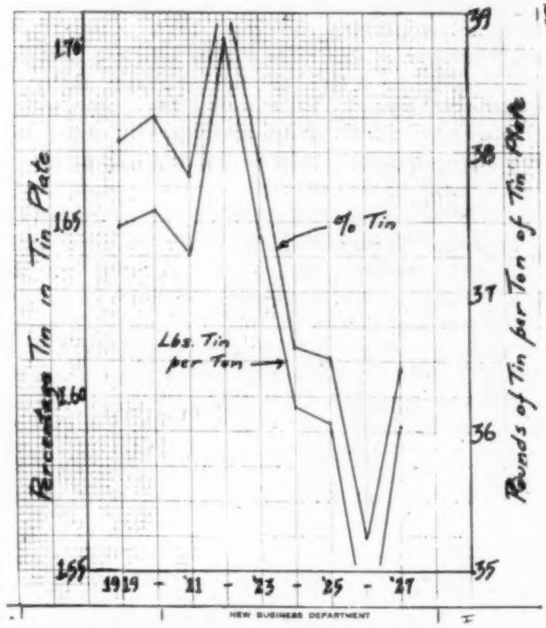
As to the future, it is to be expected that we will see continued efforts to find substitutes for tin in its manifold applications.

Marketwise tin is by far the most mysterious of the familiar metals. It is noticeable that those most fully posted frankly state that virtually they know almost nothing. It is impossible closely to measure the influence of price upon production. The influence of price upon consumption, however, is a more open matter.

Consumption of tin in the United States is roughly about 35 per cent for tin and terne plate. About 70 per cent of all the tin plate manufactured goes into canners' cans. Development in recent years of tinless cans made of black plate welded together, lacquered or enameled, has shown that these containers at times are a satisfactory substitute for tin plate. Recently there has been brought forth abroad aluminum coated steel sheets as a competitor for tin plate. The tin can, however, is exceedingly well established in the minds of the American public, and even with its faults it is practically the only all round serviceable container. It is significant

to note, when the average tin consumption of 1912-13 is compared with the average of 1926-27, that there has been an increase of only about 60 per cent, while the production of tin plate has almost doubled.

During this period, the tin plate makers have greatly reduced the amount of tin consumed per box of tin plate.



PERCENTAGE OF TIN IN TIN PLATE BY YEARS

Figure 1 shows the percentage of tin in tin plate in recent years. The decrease has been quite marked. At the same time the quality of the tin plate has been improved, which is largely a matter of uniformity and distribution of the coating, accomplished by more accurate rolling of the black plate and improved tinning methods, while the list edge, formerly involving a large loss, has been almost eliminated. Research and development have spurred on the tin consuming industries in all directions. As a result there has been improvement of quality and increased demand for tin plate.

A factor to be considered in the use of tin cans is that in many cases the tin is decorative. The attractiveness of the bright white metal is an important reason for the popularity of the tin can in the eyes of the housewife. The tin can is a good package for many articles other than foods. Its application is growing, and a glance forward into the future shows that the production and consumption of tin plate may be expected to increase at least as rapid a rate as in the past. Competitors of tin plate will have to meet trade prejudices, established customs, fixed ideas not readily changed, and in addition will be forced to develop a very complicated technology of manufacture. It is very likely that commercial progress of competitors of tin plate, irrespective of their merits, will be regretfully slow.

The history of tin and its use in industry, its application to the arts, shows that it has been notable for its most profound effect upon the physical properties of other metals. The commercial alloys of tin may, in general, be divided into two large classes: first, the alloys with copper, commonly termed the bronzes, of which there are many variations, especially in the ternary and quaternary systems; and secondly, the so-called white metals, which are the alloys with antimony, lead, sometimes bismuth, and often with small proportions of copper. The white metals are generally subdivided into the anti-friction or bearing metals, printers' alloys, the pewters and Britannia metal, the solders, and those special alloys applicable for special castings in the chemical industries, battery plates, bullets, collapsible tubes, and foil. In addition to these, the so-called die casting alloys and toy and mold metals are becoming increasingly important.

The use of tin as an alloying agent with copper is an application which should increase in the future as the result of the greater desire for more durable materials in alloys of special characteristics, as well as metals of greater corrosion resistance. It is one of the uses of tin where the metal is almost absolutely necessary and for which we have few substitutes unless some of our modern alloy steels of the stainless type for example be considered as competitive.

Approximately 25 per cent of the tin consumption of the United States is used for making up solder, and from 15 to 20 per cent for bearing metals, of which the automotive industry is a very large consumer. Since 1912 automobile production has increased 835 per cent, with every indication that the market for this commodity is far from saturated. The tin consumed in the automotive industry during recent years has been from six to eight pounds per average car. Solder has been conserved by methods which are less wasteful of the material, such as mechanical soldering and by decreasing the tin proportion or by an attempt to substitute cadmium for some of the tin. Nevertheless, even with this development we certainly can look hopefully forward to the future and to the automotive industries as being the cause of greater consumption.

In statuary metal and objects of art there has been no tendency away from tin bearing bronzes but rather a trend substituting bronzes for other metals. Many of the coveted honors in life are perpetuated in bronze. An example is the Victoria Cross, the highest military decoration of the British Empire. These were struck from gun metal taken from the trophies of the previous wars.

There is no indication of any serious nature at the present moment that the publishing industry and the printing art could any more dispense with tin in printers' alloys than they could with another essential—carbon black. Our publishing business is on the increase and we can look forward to a constant and increasing annual consumption of tin in these uses.

Hot dipped products, tinned articles, may be expected to increase in tonnage with increase in population and wider use, with a resultant increase of tin consumption in these industries. In many cases tin is a decorative metal and in these applications has no competitor at the present time, although in connection with corrosion resistant coatings the use of pure nickel as a base metal or of chromium plated equipment has been considerably agitated of late.

It is in foil and tubes particularly that the future does not look as bright as it might for tin metal applications. Aluminum foil has become a serious competitor of tin foil, almost completely supplanting it in respect to certain products, such as the wrapping of chocolate. The same is true of collapsible tubes. This competition may be traced almost entirely to the attempt by producers of other metals to find new outlets for their products. There has been relatively little technical development in tin foil manufacture. The substitution of other metals for tin in foil and tubes is a tendency which is on the increase rather than otherwise. Collapsible tubes are also made of lead except where health requirements intervene.

Tin salts and compounds, such as the oxide used in enameling and translucent glass, have had to meet competition from antimony and zirconium oxide upon a price basis. Zirconium oxide has been employed as a substitute

in ceramic glazes where considerable economy is effected of a ware equal to that produced with tin.

During the past ten years the Bell Telephone System has been gradually substituting antimony for tin in lead cable sheathings, thus realizing a considerable saving. On the other hand, the British Admiralty has recently issued specifications for lead cable covers containing three per cent of tin as a result of five years' experiment in which many combinations were discarded as unsuitable. The future in this case is somewhat in doubt.

Nickel is being substituted for a part of the tin in brass and bronze, and roller bearings on railway cars and other mechanical and vehicular equipment may be considered as substitutes for babbitt and other bearing metals.

In the case of tin and tin salts used for plating, the increase in popularity of individual electric refrigeration systems has brought in its wake a great expansion in tin plating, with attendant increased consumption of tin salts and metal. It is expected that these trends will continue in the future.

During the last year tin metal has suffered a marked decrease in price. It is foolish to speculate, because of the many variables involved, as to the price of tin in the near future. The changes in consumption and application stressed in this paper represent actual accomplishment and there is no reason for assuming that cheap tin would result in a reversion to older practices unless some of the advantages previously obtained by the use of tin had been lost by the application of substitutes. There might, however, be an expansion of tin consumption in new uses. In contradistinction to other metals which at times were produced in excess of demand, there has seldom if ever been any market development or search for outlets for tin metal. So much has been done that perhaps there is little room left for further economies. The industries using tin promise continued expansion. In the last fifteen years consumption of tin in the United States has increased considerably more than that of the rest of the world. It is to be expected that progress will follow similar lines in the future. Even in the face of the development work on substitutes for tin, the total effect on the consumption of the metal has been very much less than might be expected. The tin can still holds its own and seemingly will continue to do so.

The same is true in other fields of application and only in the application of tin as foil and tubes and in chemicals is there any darkening of the bright sunlight of the future.

Aluminum: Its Present and Future Status

A Resume of Twenty Years' Experience and the Prospects for the Future

By ERNEST V. PANNELL
Technical Advisor, The British Aluminium Company, Ltd.

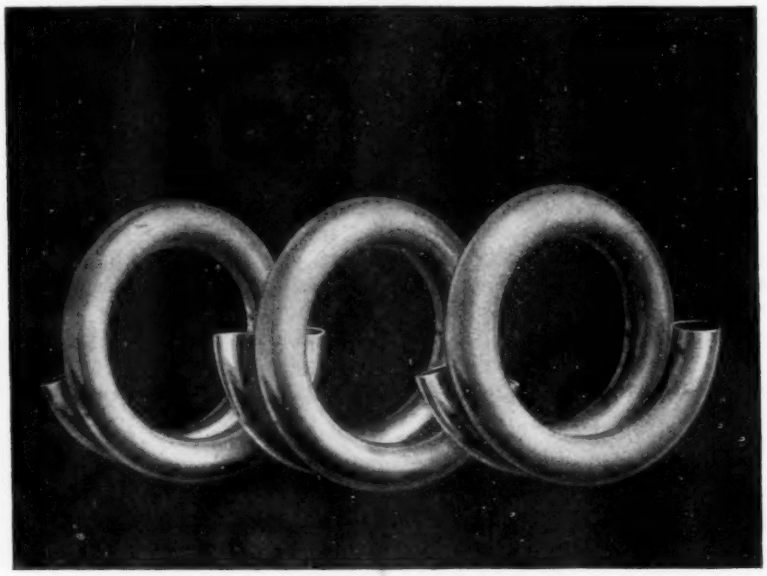
TWENTY years forms a useful period for estimating the development of an industry. In this period fluctuations due to seasonal or unusual happenings will be averaged out and the rate of growth of the industry can be determined. The period from 1908 to 1928 was especially fruitful in many industries and showed the effect of peace, war, depression, prosperity and competition. Considering non-ferrous metals, the most important of these, namely copper, was produced in 1908 at the rate of 832,000 short tons, while twenty years later in 1927 the production was a little over double this amount, or 1,694,000 tons. Spread over the entire period therefore the rate of growth of the copper industry may be said to have averaged out at approximately five percent per year. Turning to aluminum, it is found that the world's production in 1908 was 24,000 tons, growing to the considerable total in 1927 of 214,000 tons; a nine-fold increase. The average rate of development of the aluminum industry was, therefore, approximately forty percent per year, or about eight times as great as that of copper. This does not, of course imply anything directly competitive between the old metal and the new, but copper production being one of the oldest and most firmly established of the world's industries, it forms a useful measuring stick for comparison with other elements.

ERNEST V. PANNELL

Copper production of nearly 1,700,000 tons in 1927 was eight times the tonnage of aluminum produced for the same period. However, allowance should be made for specific gravity. A given cube of aluminum will weigh only thirty percent as much as the same volume in the red metal. In volume, bulk, or quantity, therefore, copper production is not eight times but only two and seven-tenths times that of aluminum. If the 1927 production of the two metals were piled up symmetrically on bases one hundred feet square two bright metallic towers would rise, that of copper being 610 feet and that of aluminum 255 feet in height. As regards the future production of aluminum it is safe to say that on the basis of new plants now going into service, the supplies of the metal will continue to show a steady increase during the coming years.

It may be asked "What are the new uses and properties of aluminum which indicate that its production and sale will continue to increase at a rapid rate?" The answer lies in two facts. First, aluminum and its alloys are being adopted in industry not on the score simply of lightness or novelty but on the basis of sheer engineering merit. Secondly, the word "aluminum" is used to cover a wide diversity of alloys which, with their varied properties and uses bear the same relation to the parent metal that the brasses, bronzes, gun-

metals and the like bear to copper. The writer had occasion recently to compile a list of sixty-five casting alloys of aluminum, each of which had its distinctive properties and distinctive merits. Probably some twenty-five different compositions of forging alloys are in existence and extending in use. Light alloy metallurgy has progressed during the past ten years to a point where an aluminum alloy exists for virtually every purpose, and whether the requirements be for great stiffness or ductility, exposure to marine or chemical influences, great resistance to shock or fatigue, or almost any other combination of conditions, it will be found that a suitable metal has already been studied and developed. The principal activity of the technical bureaus of the various aluminum producers lies, therefore, in diverting inquiries to the most suitable of alloys already developed and advising on their handling and treatment. The following indicates the present and some of the future possible uses of aluminum in a few selected industries.



AT THE LEFT ARE ILLUSTRATED SEVERAL ALUMINUM MANDRELS FOR INNER TUBE MANUFACTURE. THESE ARE BEING USED IN THE LARGEST TIRE AND TUBE PLANTS THROUGHOUT THE WORLD.

AUTOMOBILES

To some degree aluminum castings have been replaced by steel stampings due to the constant cheapening of car production. On the other hand, aluminum has developed new fields of its own based on technical merit. Chief among these is the light alloy piston which has been adopted by reason of the superior engine performance arising from its light weight and high thermal properties. More than thirty million pistons were produced in 1928. With the tendency to higher performance comes higher compression ratios in the cylinder and the next development cannot fail to be aluminum cylinder heads. These are already widely used in European practice as well as by Pierce Arrow and Mack Truck in this country. Further improvements in efficiency are being achieved by some makers who employ forged light alloy connecting rods. One-half the weight of the steel rod is thus saved and the engine performance still further improved by reduction of the inertia forces. Most important are the developments in motor coaches where heavy weight is not only unprofitable but in some places actually contrary to legislation. Some vehicles, such as the Versare coach (built in the United States) and the Short Brothers coach (built in Great Britain) are built almost entirely of aluminum alloy, the entire structural frame above the chassis being designed and constructed virtually on the lines of a Zeppelin. In these vehicles the design tendency is in favor of forged, heat treated Duralumin frames, a skeleton structure of light Duraluminum angles and panels and roof of aluminum or light alloy sheet. Aluminum castings are employed for crankcase, transmission housings and often for rear axle and road wheels. The interest in this type of vehicle indicates a wide increase in its use in the coming years. A still more radical alloy design has recently been introduced in France by the Fonderies et Forges de Crans. In this case the entire automobile chassis including cross-members, engine and body supports, is cast in a single piece, using Alpax silicon alloy. This remarkable construction not only saves fifty percent of the weight of a standard chassis but eliminates a very considerable amount of fabrication assembly, welding and riveting. These advantages will far outweigh the disparity between the cost of aluminum and steel. In America one of the probable developments of the near future lies in the front wheel drive with which several manufacturers are now experimenting. This device will call for castings and forgings of considerable mass at the front end of the chassis and the use of light alloys will be imperative.

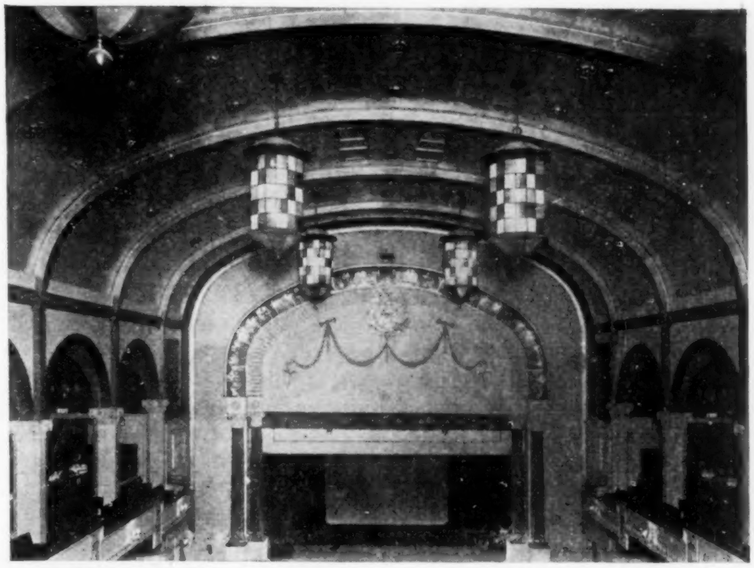
AIRCRAFT

Light alloys are basically the most important element in air navigation whether the craft be of the airship or airplane type. The work of Junkers in Germany, Breguet in France, and Stout in the United States have shown that metal airplanes are intrinsically better engineering than those of composite construction, if only from the standpoint of reduced fire hazard. The employment of Duralumin or other high tenacity, light alloys for the frame, the fuselage, the wings, rudders and struts gives the engineer a material of which the tensile strength, yield point, elongation, hardness and elasticity are accurately known from hundreds of tests and on which the factor of safety and working stresses can be confidently figured. Lifting power and speed have both been increased by the improvement and better knowledge of light alloys in the plane structure. In the engine the use of cast aluminum alloy cylinder heads, pistons, crank chamber and supercharger castings is well established. Such castings are now being reduced still further in weight by the adoption of heat treated alloys of higher physical properties. One prominent engine builder is going still further by using a crankcase forged in two halves of heat treated Duralumin. The use of metal, too, lends itself to quantity production and in the great Ford airplane works at Dearborn the planes are assembled on a line in the same manner as the Ford car has been built for the last twenty

years. Some experienced observers regard aircraft production today as being analogous to automobile production some twenty-five years ago. The actual production of planes in this country in 1927 was approximately 2,000; for 1928 the total will be at least seventy-five percent greater. A study of the designs and design tendencies will infallibly show that this industry will in a very few years furnish one of the greatest channels for the use of aluminum.

Light alloys have played an even greater part in the development of the dirigible airship. In fact, it may be said that the first production of Duralumin by Alfred Wilm and the Durener Metallwerk nearly twenty years ago was closely associated with the construction of the first German airship. Improvements in the alloy have kept pace with improvements in the airship down to the modern Graf Zeppelin, and the present forged and heat treated alloy of 70,000 lbs. tensile strength is the outcome of the requirements of airship builders. Perhaps the latest word in the progress of the industry is afforded by the British 100 passenger, 75 mile an hour ship the R100 which is expected to cross the North Atlantic within the next few months. The skeleton of this vessel is entirely of Duralumin the main longitudinal and cross-members being of three tubes braced together in a triangular section. These tubes are formed by winding a strip of metal in a spiral, the method being derived from the English practice in manufacturing steel bicycle tubes, and the application of this art to airship construction constitutes a distinct novelty. Aluminum alloy die castings are employed for the lugs at the junctions of the structural members. While "lighter than air" craft will obviously be fabricated only on a limited scale compared with airplanes, their considerable size and imperative necessity for minimum weight will contrive to make this a rapidly extending field for the use of aluminum. The new material "Alclad" by which sheet Duralumin is manufactured with a surface of high purity aluminum affords a valuable material for seaplanes and other craft exposed to severe weather conditions since its resistance to spray and salt fogs is much higher than that of the alloy. A new type of dirigible now being built on the Pacific Coast employs light gauge Alclad metal for the entire envelope. This dispenses with the usual textile material covering. The Alclad sheets are sewn together with thousands of rivets. (See page 28.)

THE ILLUSTRATION AT THE RIGHT SHOWS SHEET ALUMINUM CEILING AND WALLS IN MOVING PICTURE THEATRE



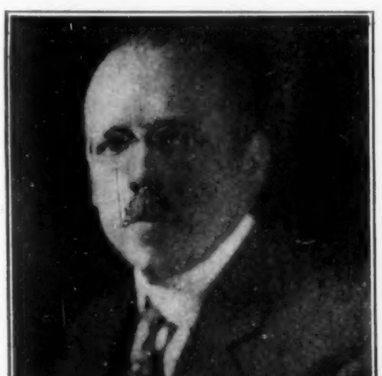
This article will be concluded in an early issue.—Ed.

The Future of Electrodeposition and Electroplating

By DR. COLIN G. FINK

Head, Division of Electro-chemistry, Columbia University

COMPARING the electrodeposition art of today with that of the art as it existed 10 or 15 years ago, the most striking change that has taken place is the entrance into the field of the metals heretofore classified as base metals, such as zinc and cadmium. Thousands of tons of pure electrolytic zinc are being turned out today and new plants are being put up all over the world for the recovery of this important metal from its ores by electrochemical processes. The development of electrolytic zinc is one of the most fascinating stories in the history of electrochemistry. There are many engineers living who shortly before the war felt fully convinced that electrolytic zinc would never be a commercial product. Credit is due companies such as the Anaconda Copper Company, the Consolidated Mining and Smelting Company, the Bunker Hill and Sullivan Company, and others, for their courage and persistence in overcoming a multitude of difficulties and finally evolving a process now universally recognized as one of the finest compliments to the chemist and engineer.



DR. COLIN G. FINK

The sister metal of zinc, cadmium, is another new-comer in the industrial field during the last half of this generation. Cadmium is being recovered by the ton at a number of electrolytic zinc plants, and cadmium plating has found uses and applications that make it superior to the familiar galvanizing. The Udylite Company, the Grasselli Company, and the Roessler & Hass-

lacher Company are among those who contributed most in furthering the cadmium plating industry.

The outstanding metal of the electroplating art is chromium, and, whereas it wasn't so very many years ago that a number of our foremost platers published statements to the effect that chromium "is not and cannot be a commercial plating metal," today the whole world is chromium plating. Chromium-plated ware has been found superior to ware plated with other metals on account of its bright, permanent luster, its remarkable resistance to wear, its high reflectivity, and its remarkable resistance to tarnish, in which respect it has excelled all other metals of its class.

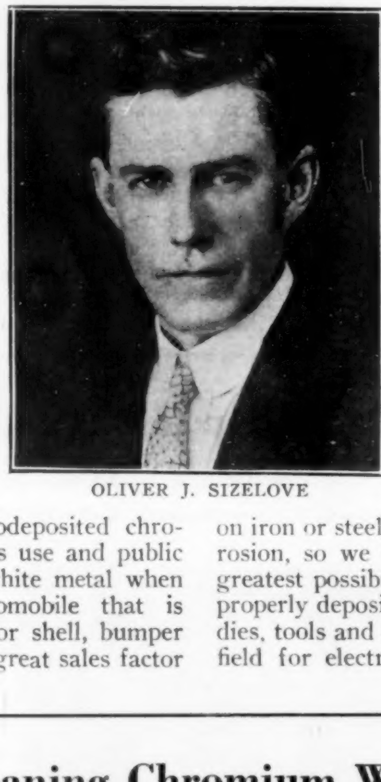
Even the most doubting of the Thomases who have seen the accomplishments of the electrodeposition art of the last few years cannot now help holding out great promises for the near future. Prof. F. C. Mathers has deposited plates half an inch thick of pure tellurium. Prof. O. W. Brown and Sister Amata McGlynn have deposited pure thallium, a metal similar to lead. Pure deposits of manganese with properties quite distinct from those of other metals can now be obtained without much difficulty from aqueous baths. Metals that have heretofore been regarded as impossible of deposition from ordinary solutions of salts in water are now being successfully applied to steel, brass, and other metals.

We have only just entered the most interesting and important era in the electrodeposition art. In a few years we shall be talking about the deposition of almost any metal from ordinary solutions operated at or about room temperature, metals that are even today looked upon as being decidedly outside the plating realm.

Past, Present and Future of Chromium Plating

By OLIVER J. SIZELOVE
Electroplating Expert

IN the year 1854, Bunsen succeeded in depositing metallic chromium, but Gunther in 1856 was the first to obtain a deposit from chromic acid salts. Very little work was done from that time until 1905 when Carveth and Curry made a study of all the work that had been previously done on the electrodeposition of chromium.


OLIVER J. SIZELOVE

The work that was done by them, established the fact that a high current density was necessary for the deposition of chromium from chromic acid baths and also that the sulphate content of the bath was a very important factor to be considered.

In 1920, Sargent published the work that he had done a few years previous and from this time on the deposition of chromium was an accomplished fact. The majority of the solutions that are in use are either Sargent's or some modified form of Sargent's solution.

Today, no subject in the electroplating field has created more widespread interest than that of chromium plating. The non-tarnishing properties of electrodeposited chromium have been the largest factor for its use and public taste is strongly in favor of this blue-white metal when used for decorative effects. An automobile that is equipped with a chromium plated radiator shell, bumper bars, headlights, and other hardware is a great sales factor and the owner of a car thus equipped, drives it with pride, knowing that no great amount of manual labor will be required to keep its bright appearance indefinitely.

Plumbing goods and builders' hardware that are plated with chromium are rapidly coming into use, and here is quite a large field for the use of chromium plated work. The jewelry trade has used it to some extent and the metal novelty line is coming to its use as a protective coating against tarnishing.

There has been a fear felt in some instances that the use of chromium plate would take the place of nickel, and, to a certain extent silver, but time will prove that the deposition of the two metals will never be supplemented by chromium. A deposit of nickel previous to chromium plate is almost essential for a finish that can be classed as a successful one. Neither will chromium ever take the place of silver on flat and hollow ware.

Chromium, when deposited directly on iron or steel, has very little protection value against corrosion, so we will not look here to its future use. The greatest possibilities are due to its extreme hardness when properly deposited, and this factor lends itself to its use on dies, tools and a great variety of similar work. In fact the field for electrodeposited chromium is almost unlimited.

Cleaning Chromium Work

Q.—Is there any special cleanser you can recommend for removing green polishing compound from angles and hollows in chromium plated work? We have used benzol for this purpose but have not found it quite satisfactory, although it does clean the work pretty well. Perhaps you know of some substance on the market, or something we can mix ourselves?

A.—The residue that is left in the background of work that has been chromium colored with a green chromium polishing compound is quite hard to remove. We have found hot kerosene the best for this material.

There is a white polishing compound on the market that is used in place of the green rouge for coloring chromium and we would suggest that you try this material. It is easier to remove and also is not so noticeable if not entirely removed. —OLIVER J. SIZELOVE.

The Past Year in Metals—Prospects for 1929

A Number of Leading Authorities Discuss the Various Lines for THE METAL INDUSTRY

The Copper Industry

THE outstanding metal of 1928 was copper. After being in the doldrums for years and showing no prospects of anything but a gradual improvement, it suddenly rose to a point where its price spelled prosperity for even the high cost producers.

The following opinions abstracted from interviews published in the daily press give the attitudes of the heads of large copper producing organizations.

Stephen Birch

"While there has been a general increase during the last few years in the prices of commodities, copper has, until the present year, remained practically stationary. The result is that in the advance this year to a 16½c level it is rather generally lost sight of that copper metal is still selling relatively low, as compared with other metals and with commodities in general. Pig tin is selling something over 14 per cent above its 1913 (pre-war) level; lead is selling almost 50 per cent higher; zinc about 11 per cent higher; pig iron over 20 per cent higher. As against these advances, copper at its present selling price is selling less than 2 per cent higher than its pre-war price.

"All indications point to a continuing large demand and, with conditions as they exist both within the industry itself and in business generally, there should be no apprehension as to the future of the metal price both near by and distant."—STEPHEN BIRCH, PRESIDENT KENNECOTT COPPER CORPORATION.

Walter Douglas

"The copper production of the mines of the United States in the current year will probably reach the unprecedented total of 1,100,000 tons and as domestic consumption requires in excess of 1,000,000, or, in other words, there will be a surplus for export of about 1 per cent of the production. The awakening of the public consciousness to the permanence, beauty and utility of the metal has, through the efforts of the Copper and Brass Research Association, increased the per capita consumption to sixteen pounds, as compared with five pounds in Europe. Obviously, if the domestic demand continues to grow the United States mines will not be able to supply it without increasing their investments very materially. This would require much additional capital and time, but in the case of some of the properties it is entirely feasible. I would anticipate that the mines will be able to supply the domestic consumption for many years to come."—WALTER DOUGLAS, PRESIDENT PHELPS DODGE CORPORATION.

Charles Hayden

"The copper mining companies have had a year of unprecedented and in fact unexpected prosperity. Never before in the history of the industry have such conditions arisen and continued as in this year for such a length of time. Big buying movements were the feature, notably in March, May and September.

"The companies have produced and sold more copper than ever heretofore. Most of them have sold their entire stock of refined metal and all that can be refined to market shapes into the month of March. Thereafter the best months of the year for outdoor work give promise of continued demand for the metal in large measure.

"At present 64 per cent of North and South American production, 55 per cent of the world production, is being fabricated in this country. Germany, in former times our best European customer, has taken about 15 per cent less than last year, whereas France has taken about 50 per cent, Great Britain 20 per cent and Italy 15 per cent more than last year, the reason being that Germany is much further advanced in the use of electrical energy than those countries. They have far to go to catch up, a condition that will require years to accomplish and an enormous quantity of copper.

"The demand for copper this year in the United States exceeded last year by 21 per cent; in foreign countries, by 4½ per cent. The outlook for the future has never been better."—CHARLES HAYDEN OF HAYDEN, STONE AND COMPANY.

The Zinc Industry

By STEPHEN S. TUTHILL
Secretary, American Zinc Institute

BELOW is a summary of conditions in the zinc industry in 1928:

Zinc Ore: Production will exceed that of 1927.

Slab Zinc: Production will, naturally, exceed that of 1927, but will be a point or two below the 42 percent of the 1927 world supply. The world production will be in the neighborhood of 1,530,000 tons, or a 4 1-2 percent increase for the year.

The production of electrolytic zinc has increased both at home and abroad, and with actual or contemplated plant additions will soon exceed 20 percent of the world total of all grades of slab zinc.

The use of slab zinc and its alloys in die casting is rapidly growing.

Sheet Zinc: At the beginning of the year it was thought that the loss in individual radio batteries through the introduction of electric radio sets would seriously affect the output of zinc in this branch of the industry, but the indications are that this loss has been made up by an improvement in the demand by the automobile and weather strip industries.

Pigments: With the exception of a decided increase in the consumption of lithopone, this branch of the industry has at least held its own.

Zinc Coating (Galvanizing): There has been no appreciable increase in the zinc coating of sheets, a slight increase in the zinc coating of wire, and an appreciable increase in the zinc coating of small and large shapes.

Specifications have already been reached by the American Standards Committee Sectional Committee on Specifications for Zinc Coating of Iron and Steel with respect to sheets and heavy shapes; excellent progress has been made in arriving at standards for hardware, for pipes, and for wire. This is a work in which the Institute is actively cooperating.

Aside from publishing "Zinc and Its Corrosion Resistance" and the "Zinc Workers Manual," the zinc industry has lagged behind other industries in presenting to consumers of substitutes for its products, information concerning the use of zinc products wherever their physical, chemical, and price qualities demonstrate their ability to equal or excel the service of competitive products now being used.

STEPHEN S. TUTHILL

Nearly 1,000 copies of "Zinc and Its Corrosion Resistance" have been distributed since its publication.

During the early work of the Institute with the sheet metal contractors, it was quite evident that there was a reluctance to use zinc for roofing and sheet metal work.

Investigation into the reasons back of this reluctance brought us to the conclusion that whatever may have been the immediate cause of this reluctance the real cause was a lack of understanding of what sheet zinc is and what it can do.

The "Zinc Workers Manual," which will be off the press before this article is published, has been pronounced by architects and sheet metal workers alike as a corrective to this lack of understanding and an incentive to a growing use of sheet and strip zinc in the future.

This book has been priced at $1.50, postpaid; $1.65 in Canada.

It is fully realized that:

"Two steps won't take us very far, we have to keep on walking. Two words won't tell folks who we are, we have to keep on talking."

Lead and Tin in 1928

By GEORGE O. HIERS
National Lead Company

PRODUCTION of lead in the United States in 1928 may be slightly smaller than in 1927. This follows the sustained drop in price. However, the world's output may be larger. Ore flotation practice which permits the use of lower grade ores and also permits the winning of more lead from the usual ores was notably important.

Secondary lead is becoming increasingly used. At the February meeting of the Institute of Metal Division in New York, papers of considerable interest were presented at the symposium on secondary metals and at the session on lead.

Some uses of lead have occurred during the year which may be considered as new. Molten lead is used in high pressure autoclaves in the Blummer process for making benzine by cracking from benzine free crude oil. The function of the lead is probably to aid in an even distribution of heat and it is said that no real coke formation takes place. A reduction in the noise made by trolley cars was made by partially filling the inside of the gear wheels with lead. Lead-thallium alloys are being used in very small quantities by the General Electric Company, for a fuse metal which gives way at slightly higher temperatures than either lead or thallium. The Westinghouse Electric & Manufacturing Company is using a new solder for electric motors. It is said to be even better than low tin high lead solders for use at higher temperatures than is possible with ordinary solders. The composition is as follows: Silver, 2½; copper, ¼; lead, 97¼.

Small amounts of pulverized lead have been used on automobile brakes to prevent them from squeaking. A new machine was devised and put into use for lead covering the heads of iron roofing nails. Some progress has been made in the reinforcing of lead used in pipe and tank form for containing chemicals.

While figures are not available it is probable that for the year there was not an increased amount of lead used for making white lead but probably there was a slight increase in the amount of lead used for storage battery production. Presumably, more lead was used for cable manufacture.

TIN

Regarding tin it is rumored that there is a tendency toward a stabilization of price but as yet it is not very apparent. Efforts to replace or substitute tinned iron with aluminum coated iron have not been entirely successful.

Recently there has been some interest in a process for obtaining tin from ores by volatilization with the use of chlorine or sulphur.

Permanent Mold Coatings

Q.—Please give me directions for mixing a coating for permanent cast iron molds that are used for casting iron. I prefer something that could be sprayed on.

A.—Lamp black and vinegar mixed so it will spray nicely, gives very good results on iron molds for casting iron. It should be applied preferably by air pressure over the hot die.

There are, however, some prepared washes on the market that are said to be very good.

—W. J. REARDON.

Aluminum

By ALUMINUM MAN

WITH the advent and development of strong aluminum alloys a wide field has opened up for their use as structural material. The day when aluminum could be considered as only a cooking utensil material has long since passed.

To be sure, the aluminum cooking utensil business continues to grow for the metal is eminently suited to that use. By the same token there is a constantly increasing demand for aluminum foil in the confectionery trade for wrapping candies of all sorts. In 1928 some 6,000,000 pounds of aluminum foil were used to wrap chocolate bars, candy of all kinds, chewing gum and in the manufacture of fixed condensers and the like.

The automotive industry has long used aluminum and its alloys, particularly in engine construction, where it is found in the form of sand, die and permanent mould castings, forgings and other wrought forms. Of particular interest in this field is the widespread adoption of aluminum alloy pistons. Some 79% of all makes of American cars are so equipped. In this connection it is interesting to note that approximately 20,000,000 pounds of aluminum pistons have been fabricated during the past year, both for original equipment and replacements.

Insofar as the commercial car field is concerned we find an even greater interest in aluminum construction than among the pleasure car manufacturers. Obviously, the same advantages accrue from the use of aluminum in a truck engine as in a passenger car engine. However, the truck manufacturer, the truck body builder and the commercial car operator are all vitally interested in pay load and operating and maintenance costs. This interest gives to aluminum an opportunity to show its worth in body construction. If, by using a strong aluminum alloy body, the operator can save a thousand or fifteen hundred pounds dead weight (as has been done), he has two courses open to him. That body can either be used to increase his pay load by exactly the amount of the weight saved or else he can purchase a chassis of less capacity and still do the job at hand.

Even though the first cost of an aluminum body is greater than one of the conventional wood and steel construction, nevertheless the increased revenue resulting from the larger pay load makes it a profitable investment. Naturally, higher revenue per trip means a lower operating cost. Over and above this is the additional advantage of lower maintenance expense for the aluminum body, since it is not necessary to paint it to protect it from the elements, nor is the danger present of rotting and rusting.

As everyone knows, street railways and railroads have also turned to strong aluminum alloy construction with marked success. In fact, the whole transportation industry from the railroad to the airplane finds in aluminum the long sought solution for strong, light-weight and durable passenger and freight carrying units, which offer the added advantages of low operating and maintenance costs.

Turning from the field of transportation, there are certain rather specialized products worthy of consideration. For example: aluminum chairs, (also made of strong aluminum alloy, each unit welded and heat-treated to form a chair of one piece construction) are furnished in a variety of styles in wood-grain or solid color finishes, with a wide choice of upholstering materials. These chairs are familiar to many who have seen them in offices, dining cars, libraries, banks and cafeterias. The New York Life Insurance Company purchased several thousand for use in their new offices.

Aluminum is rapidly finding a place in architectural work. First of all there are shingles and roofing accessories, which make it possible to roof your house entirely with aluminum. Then there is corrugated sheet for siding or any other purpose. Ornamental grills, copings and other decorative castings are made of aluminum. A most interesting application is that of aluminum spandrels. One of the most recent examples is the Koppers Building in Pittsburgh whereon 110,000 pounds of aluminum spandrels were applied.

Looking forward it is possible to see aluminum not only more extensively used in those places with which everyone is familiar but also in many new and equally interesting applications.

The Year's Progress in the Nickel Industry and the Outlook for 1929

By A. J. WADHAMS
Manager, Development and Research Department,
The International Nickel Company, Inc.

THERE has been a continued expansion of the use of nickel alloys, resulting in a very appreciable increase during 1928, in the consumption of refined nickel.

The domestic consumption has almost doubled. Improved conditions in Europe have resulted in increased foreign consumption. The world's consumption of nickel is now greater than in any previous year except possibly the war years of 1916 and 1917.

Improved smelting and refining methods have resulted in a general improvement in the purity of all commercial forms of refined nickel and have made possible the production of a grade of electrolytic nickel that has an average purity of 99.90% or better. This is the highest grade nickel produced on a commercial scale. It has the added advantage of being substantially carbon and sulphur free.

Electro-nickel is particularly suited to the special requirements of the producers of high nickel content alloys, such as nickel-silver, copper-nickel, nickel-chromium and ferro-nickel alloys.

The demand for this high purity electrolytic nickel has been increasing steadily. It is now available in full size cathode sheets 27 in. x 36 in. x $\frac{3}{8}$ in. to $\frac{1}{2}$ in. thick, weighing approximately 125 lbs. each or cut to various convenient sizes down to 4 in. 2 in. or 1 in. squares, known as "Electro Squares."

It is anticipated that the use of this form of nickel will continue to increase in the future. In consequence facilities for its production have been substantially increased.

Many industrial applications of nickel have contributed to the increased demand. The producers of alloy steels have been by far the largest consumers of nickel, but the newer uses, such as in nickel iron alloys, have also contributed substantially to the increased consumption.

A number of important developments have occurred in the consumption of nickel for steels.

NICKEL PLATING

There has been a pronounced increase, during the past year, in the demand for nickel for electroplating purposes due, partly, to the adoption of more suitable plating standards by plants organized for close technical control and the growing use of automatic conveying and plating equipment. It is now quite clear that the trend is definitely in the direction of the use of a high purity nickel anode, i.e., one containing not less than 99% of nickel. Progressive manufacturers now appreciate that heavy plates insure materially increased resistance to rust. The favor which the chromium plate on top of nickel has found has also stimulated consumption of nickel.

The growing tendency to use colored lacquers and enamels has increased, rather than decreased the use of nickel plate. It has been found that the nickel or nickel and chromium finish is needed to bring out the full effect of color. This is particularly true in the automotive industry. Where some time ago many of the automotive manufacturers were using an enameled finish on most of the exposed parts of their cars, almost all automobile manufacturers have announced that all exposed parts of their 1929 models will be plated.

The practice of nickel plating before enameling, to get double assurance against rust, is also growing.

The Nelson type compensated alumium Invar piston has come into extensive use and has received widespread publicity. The 36% nickel alloy Invar has by this means become more generally known. Important attention is being given this group of low expansion alloys, which also accounts for an appreciable gain in nickel demand.

The group of ferro nickel alloys containing from 45% to 80% of nickel have, when properly made, extraordinarily high permeability values. Alloys of this type are now being used for radio transformer cores and their use is being rapidly extended to other phases of communication systems.

As a result of considerable development work, solid nickel silver plumbing fixtures containing 18% to 22% of nickel are now available. These fixtures will remain permanently attractive and give a long period of efficient service life. They have already been extensively used in monumental types of building and their use is rapidly being extended to all the better classes of building construction. This application promises to develop into an outlet for large quantities of refined nickel.

The use of malleable nickel in the dairy industry has continued to grow within the last year and has increased by 200% to 300%, the material being used principally for pasteurizers, truck tanks and in heat interchanger apparatus, in which seamless nickel tubing is employed. At the same time another nickel-bearing product is being tried out in the dairy field, an alloy containing about 8% nickel, 18% chromium, balance iron.

One of the most useful newer applications of nickel in the chemical industry is that of caustic evaporator tubing and liners and the application of nickel for this purpose is growing rapidly and replacing chiefly steel, which is not sufficiently corrosion-resistant to give long service life.

The use of Monel metal has continued to increase and its consumption it at present at the high point of its history. Among the rapidly growing fields of application for Monel metal are those of the food manufacturing and serving industries, packers, the hotels and restaurants, as well as the electrical industry which is employing increasing quantities of Monel metal for structural purposes in connection with switchboard and line equipment, chiefly bolts and nuts.

From these encouraging signs, and in view of the soundness of the present market development policy, it seems reasonable to expect the nickel industry will contime to grow. There are so many applications for nickel that numerous fields remain relatively undeveloped. It is also satisfactory to reflect that the ore deposits already blocked out are ample to take care of the nickel requirements of industry for many years to come.

Secondary Metal Reclaiming

By E. S. TOMPKINS
Mining and Metallurgical Engineer

THE introduction of the electric furnace in the melting of non-ferrous metals has brought about many changes in brass foundry practice, and it has materially effected the character and quantity of by-products with which the foundry operator has always had to contend.

Even with the electric furnace, skimmings containing some slag and charcoal are made with each melt, requiring mechanical cleaning before the metal can be recharged, and to this must be included spillings and sweepings and other forms of refuse which accumulate in every foundry.

Still there are very few brass foundries handling any reasonable tonnage who have entirely dispensed with the pit fire or oil or gas fired crucible furnace, and these types of furnaces greatly increase the volume of by-product to be treated or sold to the smelter.

The recovery or washing plant in any foundry has always been considered an evil, though a necessary one, and when designing plants of this nature the writer has tried to combine efficiency with simplicity so that now one or two men are all that are necessary to handle the accumulation of the largest foundries in this country.

The prime object is to recover the metal in its coarsest and cleanest state so that practically all of it may be remelted and thereby utilize the entire alloy value. Any metal bearing product sent to the scrap metal refiner is sold on the copper content only and from which is deducted a smelter charge as well as the freight.

Such shipments are difficult to sample, especially if the mass contains irregular shapes and the smelter sampler must insure himself against reporting an assay higher in value than is actually the case, so this also works against the foundry return.

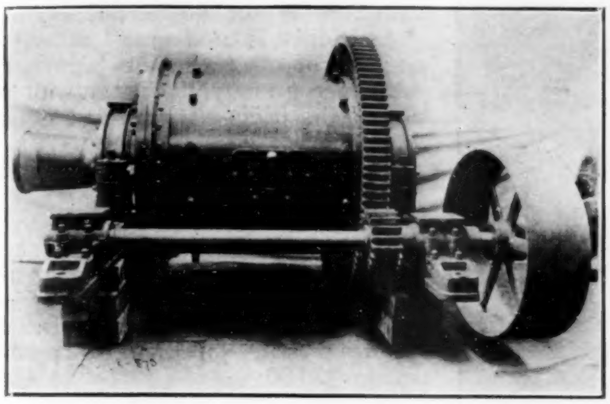
Practically every reclaiming plant incorporates some of the practices used in ore dressing for the recovery and separation of the mineral from the gangue. Some of the old plants were built by ore milling experts imported from the Missouri lead districts, and incorporated primary jaw crushers, stamps or the older types of ball mills, elevators, jigs, classifiers, screens, and a maze of other equipment requiring expert operators and a corps of mechanics to keep the machines in running order.

Of necessity, such plants have been relegated to the scrap heap, not only because the extraction was poor,

but the cost of operation very often amounted to more than the metal recovered was worth.

In the recovery of mineral from ore the method of crushing plays the most vital part in the subsequent separation and such a condition also applies to the separation of the metal in the foundry by-product.

This crusher should be of heavy construction, requiring little or no attention and necessitating repairs but every two or three years. It should be the type of machine whose grinding medium can readily crush all of the friable slag, semi burned coal or coke and ash so that the metallics are freed from any foreign substance.



MILL FOR CRUSHING WASTE MATERIAL

Such a mill or crushing machine should be self discharging so the clean free metallics may be immediately removed from the grinding medium to avoid over-grinding of metal on metal, thus producing a fine metallic which is impractical to remelt. Continuous removal of the crushed mass makes the separation of the coarser metallics possible by passing the entire crushed product over a revolving screen or trommel with openings of about 1/8 or 3/32".

This coarse clean metal ranges in size from the opening of the screen up to 1" or 2" and should contain no impurities. The product passing through the screen is ideal for treating on a standard ore concentrating table and the shot and fine metal comes off as a concentrate averaging as high as 90% metallics. The table concentrate can be riddled at about 20 mesh and the product retained on the screen riddle can be mixed with the coarser metal from the mill screen. The fine metal passing the 20 mesh screen contains practically all of the oxides and the foundryman has found that it is better to exclude this from his furnace charge because of its refractory nature. The table tailings are virtually free from any metallics, the losses being in the oxide, so that the only product shipped the smelter is the fine riddled metallics passing 20 mesh.

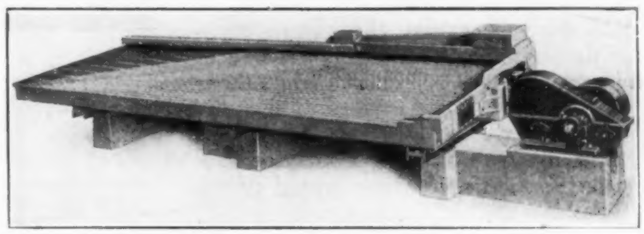
Many plants of this type have been installed in recent years and the custom smelter today is deriving but small revenue from this type of scrap.

Any foundry today producing five or more tons of such refuse can show a saving of from 4¢ to 6¢ per pound of metal contained if it is treated at the foundry instead of being sold to the smelter.

A single mill or crusher and one concentrating table will handle from one to two tons of product per hour, and in many cases such a plant is operated but one day a week to handle the total refuse accumulation.

The saving of each man is equivalent to $1,500.00 per year and plants using these more up-to-date methods have paid the initial cost of such an installation in less than a year's time on the saving of labor alone.

To insure continuous and uniform operation it is desirable to discharge the refuse into a hopper or bin of sufficient size to handle a single batch of product, if several types of ashes or skimmings are to be treated separately. This hopper is equipped with an automatic feeding device insuring a uniform gravity feed to the crushing mill. Very often the mill is at sufficient elevation so that the fine metal and crushed slag and ash passing through the screen attached to the end of the mill can likewise give a gravity feed to the table or this product can be pumped to the concentrating table. The coarse screened metallics can drop into a box or wheelbarrow placed on the floor at the end of the screen without the necessity of rehandling.



CONCENTRATING TABLE

The table tailings might also be disposed of by pumping to a dewatering device and if water is an item of expense it can be reused.

Many of the most up-to-date plants have neglected this important phase of their operations and a careful survey can be made to check up on what is being shipped to the smelter and its return as against the true value of their own product to them if it were handled in their own plant.

The Precious Metals

By G. H. NIEMEYER
Vice-President, Handy & Harman, New York

GOLD

JUDGING from the facts available at this time, it would appear that there was a decrease of about 5% in the amount of gold used in the arts during 1928. There is a notable revival of the use of colored gold for jewelry, following a fad for white gold and other imitations of platinum, for which gold as well as base metals such as chromium have been used. Noticeable increases are apparent in the demand for gold toilet-wares, dinner services, novelties, etc., as well as for gold for plating costume jewelry, radio parts, safety razors, etc.

SILVER

It is estimated that the world's production during 1928 totalled approximately 248,400,000 ounces, which is about 3,000,000 ounces less than 1927. United States' production is reported to be about 56,000,000 ounces or 4,000,000 ounces less than 1927. Mexico shows an increase from 104,600,000 in 1927 to 105,400,000 in 1928.

The consumption of silver in the arts and industries is estimated at 33,500,000 ounces, about the same as in 1927. The sterling silver industry, which is the largest single factor, showed a slight gain over 1927. The chemical

industry, which includes photography and motion picture films, was about the same as the year before, but silver-plated wares showed a decrease, undoubtedly due to some extent to the revival of the fad for pewter.

The market price was unusually steady throughout the year, the New York Official quotation being 57½¢ on December 31, 1927, and 57⅜¢ on December 31, 1928. The highest New York Official price was reached on May 24th 63⅝¢. The low was reached on five different days throughout the year, 56½¢. The average New York Official for the year was .58176.

G. H. NIEMEYER

PLATINUM

Figures are not available for the entire year, but according to the Department of Commerce imports of platinum during the first eight months in 1928 were 82,711 ounces compared to 90,010 ounces for the same period in 1927—a decrease of about 8%. Iridium imports were only about half as much in 1928 as in 1927 for the first eight months, figures being 1,681 ounces in 1928 against 3,380 in 1927. Palladium imports for the first eight months of 1928 were more than three times those for the same period in 1927, the figures this year being 8,067 ounces while those in 1927 were 2,654 ounces. The outlook for platinum does not appear to be especially bright at the moment, as there is no doubt that world production is in excess of consumption, a condition which would normally make for lower prices. Platinum is a luxury metal. It is used to a large extent for jewelry—probably 60 to 75% of the entire consumption being used for that purpose.

The palladium market has not been very active, probably due in a large extent to the change in the platinum stamping laws which went into effect during 1928 in New York and Illinois. There is also a lessened demand for palladium in the dental industry.

As iridium is used almost entirely as an alloy of other platinum metals, the demand constantly fluctuates with the use of the iridio-platinum and osmiridium alloys.

PRICES

Platinum sold at about $72.00 an ounce early in January, 1928. It rose shortly thereafter to $90.00 an ounce about the middle of the month. Since that time the price has steadily declined to the present quotation of approximately $70.00.

Palladium—the market opened at about $56.00 an ounce in January, 1928, and has slowly declined until it is now about $42.00.

The price of iridium went down to about $115.00 an ounce during the latter part of 1927, rising from $115.00 an ounce on December 20th to nearly $500.00 an ounce a month later. The market quickly reacted to approximately $300.00 in February and has since fluctuated between $265.00 and $300.00 an ounce.

Outstanding Developments in Electroplating in 1928

An Interview with F. T. TAYLOR, Vice-President, Hanson-Van Winkle-Munning Company, Mattawan, N. J.

THE electroplating industry has had a big year. Its volume has increased and its scope has widened. The tremendous interest which the public has taken in chromium plating, has been reflected all through the industry, resulting in better and more attractive finishes of all sorts in order to attract and hold the ultimate buyer of the manufactured article.

One of the most important developments of 1928, was the installation of full automatic equipment for plating chromium. The first conveyor was restricted to small articles. After this was an assured success and operated on a full production basis, another installation was made on much larger work, automobile radiator shells to be exact. We hope in the near future to publish a full description of the latter installation, in THE METAL INDUSTRY.

The tendency in chromium plating during the past year has been to come down to lower voltages, that is to six volts or less, also to lower amperages, 75 amps. per square foot or less. This has been accomplished by improving the efficiency of plating condition. On the other hand, there has been an increasing tendency toward larger capacity units; motor generator sets are required in larger sizes, simply as a matter of economy, in that they can handle much more work at a lower cost.

The work of the plating room since the advent of chromium has been increased. This attractive finish, instead of displacing others, has called for an increased amount of nickel of a very high grade to be deposited under the chromium. Similarly the interest in the protective value of chromium plating has stimulated general interest in rust-proofing. As a result, all of the finishes of a protective character have expanded.

The plating industry has become increasingly aware of the value of controls. Chemical control may consist of analysis with subsequent additions to solution to keep it up to standard. It may consist of controlling the drag-out losses by storing rinse waters and returning them, after evaporation, to the solution. It may also mean, however, the automatic control of a solution, in other words, a "self-sustaining" solution as exemplified by the automatic prevention of the building up of trivalent chromium in the chromium solution, by means of re-oxidizing devices in the solution. This is a comparatively new line of attack in control work but it holds forth most important possibilities.

Prevention of the accumulation of this trivalent chromium in the solution can be effected by the use of a porous cup cell in the plating bath as recommended by Dr. Lukens of the University of Pennsylvania. The details are given in THE METAL INDUSTRY for August, 1928; also Lefax No. 32872, entitled "Chromium Plating from Chromic Acid Solutions" compiled by the Electrochemical Research Laboratory of the Hanson-Van Winkle-Munning Company.

Electrical control consists of the automatic control of current density by standard instruments. The value of current density control is of course, well known, but auto-

matic means of so doing is growing in popularity. Temperature control is accomplished by the thermostat, and the need of temperature control is rapidly being appreciated by the industry.

One of the important new forward steps made in 1928 was the successful deposition of nickel on aluminum by H. K. Work at the Mellon Institute. A report of this work was published in The Metal Industry for June and July, 1928. It is interesting to note that the foundation of this work consisted of the proper preparation of the surface of the base metal, aluminum or its alloys, by etching and consequently roughening up, in order to allow the electrodeposited nickel to grip firmly. Of course, after the nickel has been deposited, any other plate can subsequently be applied.

Another important step forward, although not yet commercial in its applications, was the work on electrodeposition of aluminum on other metals from organic solutions. This work, done by Professor D. B. Keyes, was reported in The Metal Industry for December, 1928. Electrodeposition of rubber was really brought to light before 1928, but it made real progress during that year.

The recognition which has come to the plating room and the attraction of attention to this department forced upon the manufacturing executive by the interest of the public, has also focussed attention on the polishing department. Plating is valuable as a protection against rust and corrosion, but it is also valuable for the beauty which attracts a buyer. Consequently the polish must be a good one. Heavy coatings are demanded which will stand up better, and finer polishing is called for both before and after plating.

An additional example of the changed attitude of the manager toward his plating department, is the fact that plating barrels which have all Bakelite cylinders, instead of wood, are growing rapidly in popularity because of their permanence and long life. In other words, plating equipment now is being bought for its utility with an eye to the future, instead of being picked up at the lowest possible price.

Galvanoplastique work has had a real impetus in two new fields.

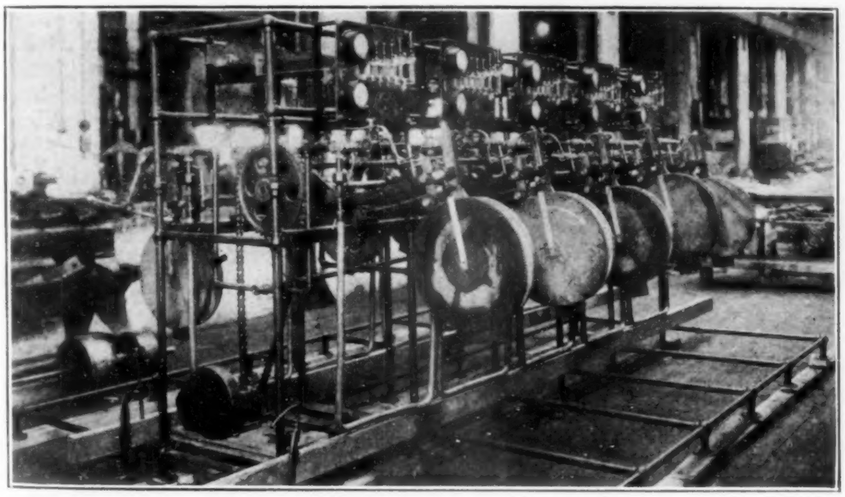
1. Molds for rubber by plating nickel directly on the pattern. In this work the cost has been cut in some cases, from as much as $900 per mold down to $200. A bronze powder is applied to the pattern, the plate is deposited on the bronze powder. The electrotype shell thus produced is backed with lead and carried in a steel frame to make the completed mold. When new designs are desired the shell can be changed quickly and cheaply.

2. The use of electroplating in phonograph record-making machines for use in the new "movie-tone" or talking pictures. The machine shown in the illustration was developed by W. R. King of the Hanson-Van Winkle-Munning Company, for use by one of the largest moving picture manufacturing companies in the United States.

In anodes, the trend is toward higher and higher purity. At the present time, the 99 per cent plus anode is attracting real interest. The depolarize anode, made of very pure nickel is a development of the heat-treated, rolled, high purity nickel anode, to relieve the passivity which occurs in these high purity anodes at high current densities and to produce smooth, uniform anode corrosion.

The anode question brings in the problem of purity of solutions which can be effectively aided by constant circulation and filtration. Constant circulation and filtration of solutions is not in general use as yet, however, due to the need for the "perfect" filter and the "perfect" pump. It may be that when these two pieces of equipment are found, the purity of the anode will be less important than it is now. In other words, the sludge which will be filtered out will give crystal clear solutions without making the use of anodes of excessive purity so necessary.

For the future there are many roads to travel which are pointed out by the developments of the past year; in other words, to carry on where work has been begun. However, there are also important untouched territories which must some day be explored.



PHONOGRAPH RECORD NICKELING MACHINE USED IN THE MANUFACTURE OF MOTION PICTURE FILM FOR TALKING PICTURE PROJECTION. ONE OF MANY UNITS BUILT BY THE HANSON-VAN WINKLE-MUNNING COMPANY

There are no standards of comparisons for high polishes and low polishes. Optical means can be used for this purpose, such as measurement of the reflectivity of light from the metal surface; eventually this method will have to be perfected.

There has been a real impetus in electroplating abroad. The United States has made such gigantic strides in production and quality that we have been the hosts to foreign visitors again and again. While it may be too much to claim that the American ideas, brought back to their homes by our foreign guests, have been responsible for their expansion, nevertheless, these visits could not have been without some result. We know that Europe is learning from American methods of quantity production. Perhaps they also feel that the quality of our product has not been entirely overlooked.

Problems in Metal Working

By P. W. BLAIR
Mechanical Editor

Preventing Wear of Taps

Q.—We are threading and tapping cast iron pieces in our brass shop and having considerable trouble with the taps and chasers holding their edge as it seems the grit in the cast iron wears the form of thread round.

Can you suggest any method to overcome this trouble so that chasers and taps will stand the wear and not have to be ground so often? What solution or cutting compound would you advise using?

A.—Cast iron can be threaded with taps and chasers with good results. If you will notice, on cast iron very frequently the presence of sand and grit in the castings laps a heavy bearing into your taps or chasers, necessitating frequent regrinding on the cutting face if you wish to retain the proper thread form.

The presence of grit will not show to the naked eye. See that you are running at the correct speed.

A lubricant compound of kerosene oil and machine oil will enable you to increase the life of your taps and chasers between grinds and the total life of same. Taps and chasers should be made of high speed steel.

Non-Corrosive Soldering Flux

Q.—We are interested in obtaining a non-corrosive soldering flux for use on copper and brass parts in delicate electrical devices. The work is not a difficult soldering operation. At present we are using a rosin and alcohol mixture, but have difficulty with corrosion. Do you know of any real non-corrosive soldering flux which is sufficiently sharp to make good joints, but still not accelerate corrosion? We would appreciate having you send us the names of manufacturers of such an article or formulae for making this type of flux.

A.—The only non-corrosive soldering flux we can recommend is a combined solder and flux, a sample of which we are forwarding. We have used this with good results. The flux composed of rosin and alcohol is very good. The Western Electric Company, at their Hawthorne Plant, Chicago, and also the Northern Electric Company, Montreal use a flux in a paste form on their electrical devices. If interested, get in touch with them and obtain samples.

Lathe for Threading Brass Parts

Q.—Can you tell us what you consider the best lathe for turning screw threads and also for general turning of small brass castings and tubing used in making optical and surveyors' instruments, etc.? There are certain German makes which are good for this type of work because the hob fits on the left-hand side of the spindle and work can be threaded with a chasing tool without removing the slide rest. Are there any such American makes?

A.—We would recommend a Warner and Swasey Universal Fox Lathe or a similar machine. This is a type suitable for cutting threads. A full line of these machines is made with chasing bar and turret heads or single tail stock. On these you will not need to remove the slide rest when using a chasing bar.

New Cutting Edges for Tools

Q.—I am seeking a process for putting an extra tough and hard wearing and cutting edge on slow speed tools. I wish to apply a metal that is not brittle by a process that will be rapid. It can be done by electric welding, but that is too slow. Do you know if it can be done by the Thermit process?

A.—A method now used for putting cutting edges on tools for lathes, planers, shapers and automatic screw machines is the application of Stellite. This is applied to the edge with an oxyacetylene torch, the material being welded on and built up just as though an end were being replaced.

The cutting qualities of Stellite are superior to any other steels on the market as far as we know from experience. The cost is high but when applied to cutting edges only, the long wear and increased production that result tend to reduce the cost to a minimum.

Quenching Metals

Q.—How can I obtain information on quenching of metals? Are there any books or pamphlets which you can recommend on this subject?

Do you know the best method of quenching a 60 copper, 40 zinc mixture which is used for tubing? Can a 66⅔ copper, 33⅓ zinc mixture be quenched without injuring the tube? What is the best method of doing this?

A.—Literature on subjects bearing on your problems may be obtained from the Bureau of Mines. The best way to obtain this is to write direct to your Congressman, stating the subject on which you wish papers, as through the machinery of his office he can locate and secure the same quickly. This service is rendered gratuitously.

Papers on internal stress in brass tubes, effect of temperature, etc., can be obtained from W. M. Corse, The Research Service, Otis Building, 810 18th Street, Washington, D. C. There will be some charge for this service.

No injury will result to either the 60-40 or the two and one copper zinc alloys if quenched after the red is out; spraying is the general practice used in cooling. Most of the trouble with brass tubing is caused either in the casting shop or through too high annealing temperatures and improper reduction during the breaking down operations. The finishing draw will not correct the conditions that create internal stress and faulty grain structure.

—W. J. Pettis.

Ferrules for Knives

Q.—Please tell me what white metal to melt for making table knife ferrules. The metal should not blacken.

A.—From your letter it appears you desire to cast these ferrules. If so, aluminum is the best white metal for the work.

We suggest, however, you stamp out your ferrules from sheet metal; either aluminum sheet or German silver sheet. You will find it a cheaper and better job than casting.

Neither of these will turn black. —W. J. Reardon

The Growth and Future of Electroplating

A Record of the Rise of Electroplating from an Idea to a Great Industry

By CHARLES H. PROCTOR
Plating Chemical Editor

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

DEVELOPMENT OF CYANIDES

To look at the future of the electroplating industry in America, we must first turn back time in its flight to 1807, in England, when Sir Humphrey Davy discovered the alkaline metals, sodium and potassium, which were eventually to be the basic factors in modern cyanides. That gave the greatest impetus to what, even in those early years, might have been termed the future of the electroplating industry. The history of cyanides, however, really began when Diebach, a German chemist and manufacturer, discovered Prussian blue in 1704. Lussac carried Diebach's experiments much farther in 1814, but even for many years thereafter cyanides were not yet a commercial product.

CHARLES H. PROCTOR

In the early days of electroplating with cyanides, many platers manufactured their own cyanides from yellow prussiate of potash by mixing it with carbonate of potash, heating the mixture to fusion in an iron pot and cooling to normal temperature. In later years, Castner, an Englishman, developed the modern method of producing potassium and sodium cyanides from metallic sodium and potassium, nitrogen from aqua ammonia, and carbon from charcoal. He gave us the basis for all present day manufacture of cyanides.

EARLY PLATERS

To Brignatelli we owe the first methods of electro-gilding, which he did in 1805. As cyanides were then unknown, it is presumed that his bath was prepared from gold fulminate. In the years that followed, very little was accomplished, until 1839, when C. J. Jordan discovered the method of depositing copper upon wax that had been previously coated with graphite. Thus was electroplating born. Spencer in England and also Jacobi in Russia experimented along similar lines at about the same time. They also laid claim to the process discovered by Jordan. In 1840 Dr. Wright, a surgeon of Birmingham, England, in collaboration with George Richards Elkington, first patented the basis of our modern electroplating methods, and for many years the Elkingtons, having established their rights as the originators of the process, collected royalties from licenses granted to manufacturers of metal products.

DEVELOPMENT OF THE GENERATOR

In 1844 John Stephens Woolrich, a Birmingham, England, chemist, took out a patent on improvement in coating with metal the surfaces of articles formed of metal or of metallic alloys. The specifications of this patent set forth that "the improvements consist in the employment of a magnetic apparatus in conjunction with metallic solutions," and the description of the machine precedes the account of the electrochemical process. This was the first electroplating dynamo and, what is more remarkable, it was the progenitor or predecessor of everything electrical as we know electricity with all its marvelous achievements. This crude dynamo, designed primarily for use in an electroplating process, may then be said to have been the mother of everything electrical in the modern world. The machine was operated by Thomas Prime and Son, Birmingham, England, until about 1877, when it was presented to the City Corporation of Birmingham, and, since 1899, it has found a resting place in Ashton Hall. This machine was described in one of the early issues of THE METAL INDUSTRY.

The second machine of this type was built by Thomas Prime and Son and is now owned by Thomas Canning and Company, Birmingham, England, who have kept it as a curiosity since they purchased it from the Prime firm.

In 1867 Wilde first introduced a multipolar dynamo with a redressing commutator. Weston later introduced a plating dynamo that was used for many years. Then came the Gramme machine, in 1873, which was later followed by a machine made by Siemens and Halske of Germany. Next appeared the brush machine, with low resistance—3.3 to 4.3 volts. Of all the earlier types of dynamo produced up to 1886, the Eddy dynamo, built by the Eddy Electric Company, Windsor Locks, Conn., was the most reliable and the most efficient and economical to operate. Some of this type of machine are no doubt still in operation, or were until a few years ago.

EARLY SILVER WORK

We should keep in mind the slogan of Rogers Brothers of Hartford, Conn., first makers of silver plated steel knives and forks: "1847, Guaranteed 12 Dwt." This trade mark is known the world over. It was the first standard covering a plated product. Now it is controlled by the International Silver Company of Meriden, Conn., the "Silver City," known internationally for its sterling and silver plated products. For many years silver and gold were the only deposits applied to basic metals in America. There were, however, many firms doing close plating with silver and brass, especially on harness for the horses of wealthy people who could afford such luxury. The "close" method consisted of soldering thin sheets of silver or brass to the iron or steel harness parts which were first tinned by means of the molten tin method. Soldering coppers and planishing steels were the main factors in the production of close plating, and splendid examples of this finish are no doubt still in existence in the stables of wealthy families. Newark, N. J., was a great city for close plating, and until a few years ago

there still was one plant there which did this work; but it may have gone into oblivion by now. Rolled plate and Old Sheffield plate, which were the earliest methods of producing silver plated products, were essentially close plating products. Sheffield plate products were made from silver and copper. Thin sheets of silver were soldered on both sides (sometimes only on one side) of a sheet of copper, which was then rolled down under methods of rolling similar to present day practice of metal rolling. The ductility of copper and silver being about the same, the elongation caused by the rolling pressure was uniform. Real old Sheffield plate brings very high prices today, and it is imitated widely, even to the official hallmarks of old British firms, by modern makers of "antique" silver.

Meriden, Connecticut, has always been a famous New England city for electroplated products. Some of the finest examples of the plater's art ever produced on basic metals have come from that city. In fact, the entire state of Connecticut can be considered the cradle of the electroplating industry in America. Every conceivable finish has been applied to metal goods in the Nutmeg State, and it is still the home of some of the greatest practical platers in the world.

COMMERCIAL DEVELOPMENT

From 1880 onwards there occurred the most important advances in electroplating; a transition as it were. America had asserted herself as a manufacturing nation as well as the vast agricultural one that had previously imported millions of dollars' worth of manufactured products. She commenced to export, and metal manufacturing plants grew up not only in the Eastern states but were also appearing in the Middle West. A few years later, about 1890, a giant octopus appeared in the form of a mighty French syndicate which began to control the copper markets of the world and maintained its control for about two years. Then came the break and copper went down to the lowest price in history. But in the intervening years metal manufacturers introduced sheet steel, sheet zinc and tin plated products. These were electroplated in every conceivable finish, and the movement marked the beginning of electroplating on a real commercial scale.

Here, at the beginning of 1929, this industry has reached stupendous proportions in America. Mechanical methods of electroplating have been developed and refined rapidly. Celluloid lacquers have replaced the old gum alcoholic lacquers of earlier years. Spray guns have been developed. It took several years to convince the manufacturer that the spray method had a great advantage as a labor saver, but finally it took hold and stayed, like all the other progressive devices that have been invented in connection with electroplating.

MODERN DEVELOPMENTS

The advent of the automobile in 1900 gave the greatest impetus to the American electroplating industry, although at first all the non-ferrous metal parts of automobiles were made of brass. We should think back to 1900, when the automobile first appeared, and then to 1928, when the automobile engineering world produced its greatest masterpieces, in which electroplating has been of such great importance, and we can perhaps guess at the tremendous part the electroplater will play in this industry in the years to come.

When Adams in 1869 first developed the double nickel ammonium sulphate plating solution, he could have had no conception of the future of nickel plating in America as we know it today. When Russel and Woolrich patented cadmium plating in 1849, together with brass and many other alloys, they could not lift the curtain of the future to see the modern industrial stage, nor could Bunsen and Placet and Bonnett, when they first experimented with electrodeposits of chromium. Then, in later years, when Carveth and Curry evolved the commercial chromic-sulphuric acid chromium plating solution, they did mention that the deposits of chromium resulting from the solutions they experimented with "should have a great future." Then Sargent, following shortly after Carveth and Curry, evolved a definitely proportioned chromium plating solution known as "Sargent's Solution" today, which consists essentially of chromic acid and chromic sulphate. These gentlemen gave to the electroplating industry of America commercial methods of chromium deposition that will stand as a perpetual monument to their genius.

CADMIUM TOO HIGH

Cadmium unfortunately is being cheated of its real economic value to the metal fabricating industries. Whoever is responsible for the tremendous increase in the cost of the metal is rapidly causing the elimination of this valuable metal finish. At $1.20 per pound for anodes, considering its greater density than that of zinc, its true cost as compared with zinc is twenty times as much, considering the price of zinc as roughly 8 cents per pound, for an equal thickness of metal deposited under normal plating conditions. Hundreds of firms have adopted cadmium for rustproofing steel and iron parts—especially in the automobile and radio industries—that could use improved zinc deposits from cyanide zinc solutions and obtain just as efficient protection from rust as is obtained from cadmium. There is, however, an advantage in the electrodeposition of cadmium from cyanide solutions: it can be deposited upon any commercial metal without any difficulty whatever. One great automobile firm with which the author has of late been in contact intends to eliminate cadmium coatings from forty-eight steel parts, which will be plated with zinc or coated with rustproof black finishes. Many other firms are also changing over to these more economical methods. The price of cadmium should be lowered to keep the metal in use. If this is not done, zinc will be deposited from cyanide solutions wherever possible and a final thin deposit of tin from a modern electroplating tin solution will be applied. Experiments with this type of deposit have resulted in rustproof coatings which may be superior to cadmium. The zinc deposit protects steel and the tin protects the zinc from atmospheric oxidation. The combination will be only slightly more costly than zinc, while the finish will be whiter than cadmium at a fraction of its cost.

AUTOMATIC PLATING

Few platers realize what automatic plating has accomplished in economy of production unless they are actively engaged in automatic plating. A short time ago the writer saw in a plant an automatic conveyor plating unit for brass plating steel chain. The output of this unit was 120,000 pounds per day. The approximate chemical cost of plating the chain was better than 23 pounds for one cent, by weight; 8,000 gallons of brass solution were used, and cleansing, washing and drying of the chain was a part of the automatic unit. It is estimated that $25,000 per year will be saved in upkeep of solution and at least one-third of the original labor cost, for ordinary still tanks can be saved in plating this chain. It can readily be seen that the cost of this unit was saved in less than a year, with a large sum left to pay dividends on the investment. In another plant a continuous unit is used for cadmium plating steel radio parts, and a saving in labor and materials are proportionately great. These are only two of many similar units in operation. In a very extensive electric refrigerator manufacturing plant, a 20,000-gallon electro-tin plating mechanical unit is operated. The unit

is complete, from cleansing the basic product through copper plating to cover soldered joints, to final tin plating and drying, so that the finished product is conveyed directly to the inspectors' hands.

Mechanical units are used extensively in the automobile industry. Their first application was in zinc plating tire rims for motor cars and trucks. Under the old separate plating tank conditions the cost of zinc plating a steel rim was 6 to 7 cents. Today similar rims are zinc plated—and have been for several years—at close to a cent a rim.

A large automobile plant at Flint, Michigan, has installed a complete automatic conveyor equipment for chromium plating radiator shells. The progress being made by this unit is being watched very closely, because chromium plating in a mechanical unit is a very great step ahead, and many authorities still question the possibility of successfully and economically accomplishing such an achievement. Mechanical movements, however, are very important in electroplating, and will be a factor in chromium in the future.

The writer has been in plants where a dozen large nickel plating solutions were in operation, plating automobile parts. Each of these solutions was controlled chemically; the dozen solutions became as one unit and were analyzed and maintained as a unit. In another plant twenty mechanical plating barrels used for nickel plating steel parts and an equal number for brass plating were similarly controlled. This is being done in many plants. A steel reserve tank, elevated about 15 feet above the plating tanks, has about 120 gallons' capacity and is arranged with steam coils for dissolving the chemicals used in upkeep of the solutions. The filtering of the solutions is done by gravity upon the return of the solutions to their respective tanks.* Furthermore, in extremely cold weather the normal temperature of the entire solution can be controlled by one automatic unit for all tanks.

AMERICAN ELECTROPLATERS' SOCIETY

In THE METAL INDUSTRY for August, 1912, page 345, is shown a splendid photograph of a "chemical laboratory and outfit where the students of the new plating school will perform their experiments." The school was to be in charge of Herman Reama, a member of the then existing National Electroplaters' Society of the United States and Canada, later the American Electroplaters' Society. Mr. Reama, who for many years has been with the Oakite Company, was an expert electroplater and chemist. He was to have been supported by Allen Field, an expert analytical chemist. The school never developed, due to lack of support, but great results could have been obtained if the school had come into existence and had continued until today. Its counterpart has been established by the various branches of the American Electroplaters' Society. If a research fund had been established in 1912, as was intended by the framers of the constitution of the old National Electroplaters' Society in 1909, much of what the present workers in electroplating research are now seeking to find would have been found many years ago.

The American Electroplaters' Society has been a great factor in the development of electroplating in America. It has been responsible for the development of better platers, for the introduction of chemistry in plating methods, for the elimination of trade secrets, for more economic methods of production, for assistance in working and helping to develop electrical and automatic apparatus for mechanical plating that have saved millions of dollars by reducing labor costs and the cost of chemical upkeep of solutions. It has sponsored a fund amounting to thousands of dollars which is used for research work carried on at the Bureau of Standards, Washington, D. C., the fund making it possible to keep two chemists constantly employed in working out problems outlined by a committee of the American Electroplaters' Society.

THE FUTURE

So far, then, we have traveled a long way in electroplating in America, and the future will be greater than the past. The old time methods of electroplating are slowly passing into the beyond and the splendid old time platers also are disappearing, the real master platers who could produce any finish that was demanded from them.

The plater of the future must be a chemist and a mechanical engineer to a great extent, in order that his methods will reduce costs of production to a minimum. But he will also have to learn from practical application how best to accomplish such results. He must learn electroplating and its art in the school of experience, then the chemistry and mechanics of his profession. Thus will evolve the new master plater and the electro-plating industry in America will assuredly continue foremost.

* See "The Production of Dense Nickel Deposits by Means of Continuous Filtration," by Charles H. Proctor, THE METAL INDUSTRY, May, 1907.

Course in Electroplating at City College

A COURSE in practical electroplating at the College of the City of New York was offered for the first time in the Fall of 1928. Much interest was aroused among persons engaged in the electroplating industry, including platers, shop superintendents, managers and salesmen, many of whom, together with a number of beginners and chemists, are now taking the course and making good progress.

This course will be given again in February, 1929, and twice a year thereafter, following the College calendar. The class will meet on Mondays and Wednesdays from 7 p. m. to 11 p. m. in the Chemistry Building.

The subject matter of the course will deal with the following topics:

1. Fundamental principles underlying the various operations of electroplating.
2. A critical study of each of the present processes and commercial practices of electrodeposition of various metals and alloys, including copper, nickel, chromium, silver, gold, cadmium, zinc, brass, iron, lead and platinum.
3. Principal factors involved and physico-chemical methods of control used in the operation of sulfate, cyanide, chloride, fluoride, chromic acid and a number of special baths.

Laboratory work constitutes a substantial part of the course and is designed to proceed in parallel with lectures. The experiments are mostly of deductive nature, thus bringing the student to a first-hand knowledge of the principles involved. Among the exercises to be done in the laboratory are the following subjects:

Faraday's Law; current efficiency and its determination; determination of thickness of deposit; electrode potentials; polarization and depolarizers; metal and metal-ion concentrations; hydrogen-ion concentration; addition agents; brighteners; throwing power; porosity and corrosion tests; analysis of plating solutions.

The laboratory work is arranged flexibly so as to meet the individual needs of each student.

British Progress in Electroplating in 1928

Expansion of the Industry; Bright Prospects Are Ahead

By S. WERNICK
Honorary Secretary, Electroplaters' and Depositors' Technical Society

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

IT will be generally admitted that the electroplating industry has undergone remarkable expansion in recent years—an expansion amounting almost to a revolution—in practically every progressive country in the world; and it is probably equally correct to suggest that in no country has enthusiasm surrounding the newer finishes, improved technique and developments generally been carried to such practical heights as in the United States of America. While British electroplaters are prepared to admit this and to congratulate the executives of the American electroplating industry on their foresightedness and enterprise, they may justly claim to have developed their own industry in practical fashion on a scale which is probably only second to that obtaining in the United States. The emphasis in the latter sentence is on the word "practical", for on the "theoretical" side, the industrial, technical and academic research work carried out in British works, laboratories and institutions on electrodeposition is (as no doubt American technologists would be the first to concede) on both a qualitative and quantitative scale inferior to none.

S. WERNICK

FACTORS AFFECTING BRITISH PROGRESS

There are a number of factors which operate to render the practical developments which have accompanied the "New Era" in electroplating more readily, and certainly more widely, exploitable in the United States than on this side of the Atlantic.

Undoubtedly, the principal factors are the more prosperous conditions existing in America coupled with the fact that a large proportion of the work dealt with in the plating shops may be classed under luxury goods, or at any rate, goods which are not prime necessities. One of the biggest industries falling into this class which has had a considerable effect on the plating industry is that devoted to automobile manufacture. In this respect, Britain is in a far better position today than it was even three or four years ago, and electroplating has benefited in proportion.

Another important factor is the rate at which such luxury goods become replaced. This is economically connected first, with the price of these goods, and secondly, with the capacity of the average man in the street to purchase them—in both which respects Americans are in general in a materially better position than those in this country.

In the case of auto goods (and also pedal cycles which represent an important item to the plater), the rate at which they are scrapped and replaced is robably considerably higher in America than in Britain, for although there has been a fairly steep decline in prices—particularly of cheap cars—it still falls short of the desirable standard obtaining in the United States. On the other hand, the relatively smaller percentage of scrap is partly compensated by an increase in the proportion of repair work, of which there is a considerable quantity always passing in the average British plating shop.

Lastly, there has always been a more conservative outlook here in the wholesale development of the newer technique and finishes which have become available. In part, this is intimately bound up with the causes already enumerated, the cautious policy arising from the knowledge that mistakes on a large scale are costly and therefore to be avoided as far as possible.

Nevertheless, this part must not be construed as indicating a lack of initiative and enterprise, for at the same time, work on a small scale has not only been encouraged but enthusiastically pursued, while all developments have been closely followed and, whenever desirable or promising, "tried out" for possible improvements. In a sense, this policy has been justified, for when the time became ripe for large scale experiments, it was possible to take advantage of this earlier experimental work; while, undoubtedly, it caused fewer disappointments and prevented a considerable waste of money. It is more satisfactory to dump a gallon or two of chromic acid solution down the drain than the contents of a 300 gallon vat of the same solution!

1928 DEVELOPMENTS

The past year has seen what must be considered to be a remarkable metamorphosis in the reaction of manufacturers and also the general public to the newer finishes; 1928 in retrospect will probably be looked upon as the year in which the newer developments definitely entrenched themselves as reliable finishes with many novel and desirable properties and considerable advantages over the older established finishes. The place, for example, of cadmium and chromium plating in the range of metal finishes has been more closely defined. As a result, on the one hand, the extravagant claims and "boosting" which these finishes received (as often as not from "inspired" sources) in the early days have given way to a wider knowledge of their demerits as well as their merits; while, on the other hand, the distrust and suspicion with which they were once regarded (probably in direct proportion to the unqualified appraisement which they simultaneously received) has been replaced by a due appreciation of their undoubted value in appropriate sphere. In a word, the situation has become less chaotic, wild exaggeration has largely given way to scientifically co-ordinated facts, and it may be anticipated that in the next year or two, these newer finishes will be regarded as normally, and enjoy industrial application as surely as nickel and copper plating today.

This article will be continued in an early issue.—Ed.

Acid Handling in a Metal Finishing Plant

A Description of the Large and Carefully Planned Metal Pickling Plant of the Siemens-Schuckert-Werke in Siemenstadt, Germany

By PERCY C. KINGSBURY
Chief Engineer, General Ceramics Company, New York

TRANSLATED FOR THE METAL INDUSTRY WITH SOME CHANGES AND REVISIONS FROM AN ARTICLE BY PAUL H. PERLS, MANAGER OF THE SIEMENS-SCHUCKERT-WERKE, IN "WERKSTATTSTECHNIK."

THE acid dip is an important stage in the quantity production of brass articles and one of the first problems to be considered is the storage of the acid. In small plants the carboys are occasionally stored in the yard or on the roof, but the objections to this, especially in the winter, are so obvious that they are usually moved inside. Storage in the basement soon proves to be objectionable owing to poor ventilation, which suggests as the next expedient, the upper floor or attic where the fumes may escape more readily. The storage of corrosive liquids on the top floor of a manufacturing building, where spills, leakage and condensation of acid vapors are inevitable presents however a serious hazard to employes and property.

In the brass finishing plant of the Siemens-Schuckert-Werke of Berlin, Germany, the above considerations led to the construction for this purpose of a special building with solid brick walls and concrete ceilings connected by two bridges to the main factory building housing the galvanizing and lacquering departments.

The layout of the plant is as follows: The Acid Storage is located in the ground floor in Room A (Fig. 1 and Fig. 2). Situated directly above it in room B is the equipment for the removal of copper from the pickling solution. On the first floor are located the pickling room C (Fig. 1 and Fig. 3) and the drying room D (Fig. 3 and Fig. 4) separated by a solid wall. Above the pickling room on the first floor and under the roof are installed stoneware exhaust fans direct connected to electric motors E (Fig. 3), and adjacent to them but also separated by a solid wall is the neutralizing chamber for acid fumes F.

The entire pickling operation is as follows: In the storage room A are located a set of four large stoneware vessels, each having a capacity of 264 gallons (see Fig. 6) in which the sulphuric acid is stored, together with a similar set for nitric acid. The storage of acid in carboys is considered objectionable because of the inconvenience and also because the workmen forget to replace the stoppers in the partly emptied carboys, thus permitting the nitrous fumes to escape to the discomfort and danger of the operatives. Consequently stoneware vessels were employed for this purpose. These vessels are filled as follows: By means of a special dumping device G (Fig. 1, see also Fig. 5) the acid is emptied into a storage vessel H outside the building. It is then raised by means of compressed air to the 264 gallon stoneware storage vessels referred to above. To attempt to blow the acid directly from the carboy to the storage vessels is an extremely dangerous practice as the bursting of a carboy may result in a serious accident. The four stoneware vessels of each set communicate by means of siphons and the last vessel of each set is connected to an automatic acid elevator J (Fig. 6) operated by compressed air. Each of the two acid elevators discharges through a stoneware pipeline K into a stoneware collecting vessel, 80 gallons capacity, located in the pickling room on the first floor. When acid is required in the pickling room it is necessary only to open the compressed air valve connected to the acid elevator that automatically feeds the collecting vessel. The vents of the collecting vessels are connected to the exhaust pipeline in order to draw off the fumes evolved while filling. The acid from the collecting vessels is used for preparing the various dipping solutions in the adjacent mixing vessels L (Fig. 4). These vessels are cooled by an ample supply of water in order to remove the heat evolved in mixing the acids. To minimize the danger from splashing of acid, the heavier sulphuric acid is poured into the lighter nitric acid. The fumes evolved in the mixing of the acids are drawn off by means of an exhaust fan located in room E (Fig. 3 and Fig. 8). When the dip has cooled to room temperature it is ready for use. The dipping is carried out in four large vats M (Fig. 4 and Fig. 7) provided with exhaust connec-

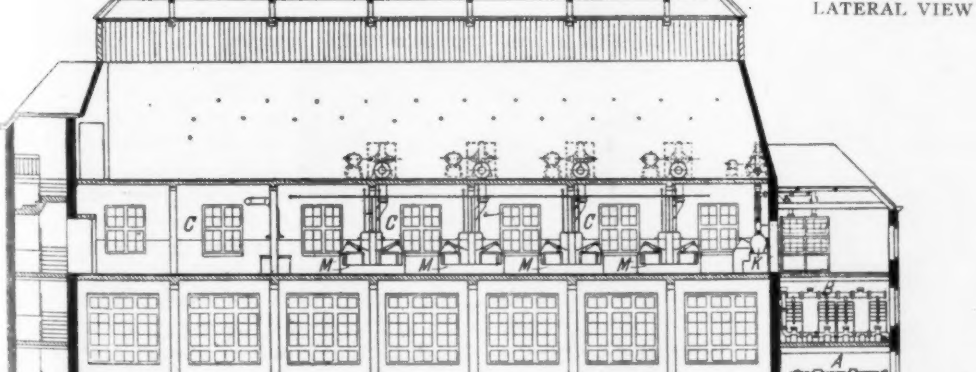


FIG. 1. LEFT—LATERAL VIEW OF PLANT

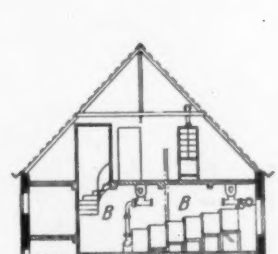


FIG. 2—END VIEW OF PLANT

tions in which are placed stoneware vessels containing either the dip or wash water.

For the pickling of copper and brass articles, either

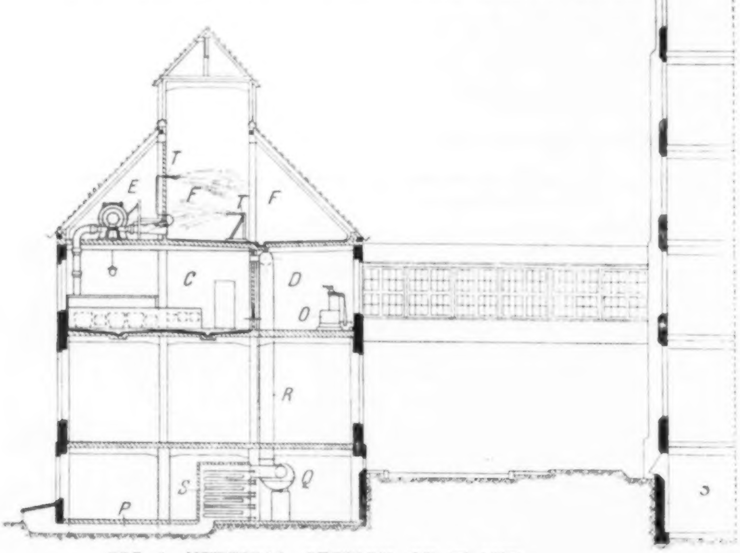


FIG. 3—VERTICAL SECTION OF PLANT

satin or bright dip is used. Before pickling the articles they must be absolutely free from grease. This is done in an adjacent room by means of trichlor-ethylene, or in

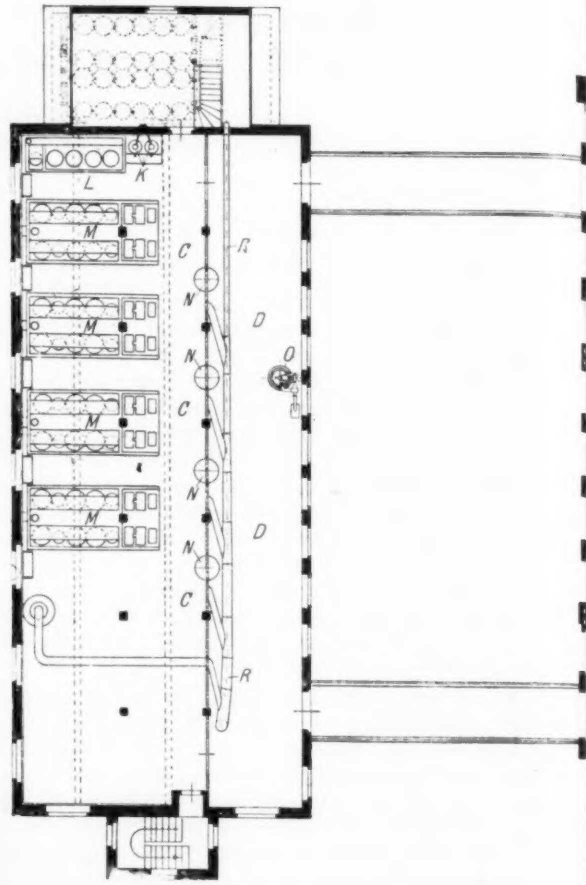


FIG. 4—LAYOUT OF PICKLING VATS

FIG. 5. HANDLING ACID WITH A SPECIAL DUMPING DEVICE

vessels containing boiling caustic soda which are installed in the pickling room. After the articles have been thoroughly cleaned of grease, they are treated as follows in the pickling vats shown in Fig. 3 and Fig. 4. They are placed into stoneware or aluminum dipping baskets suspended by wire handles and immersed in the preliminary dip. During this operation they must be dipped and redipped and shaken frequently, in order that the acid may act evenly on the surface of the metal parts. After this has been done and the adherent acid has been removed by frequent shaking, they are dipped into the adjacent vessel which contains water. The ware is treated in a similar manner in the two next vessels which contain the bright or the satin dip. After the articles have been taken from the pickle it is of great importance that they be rinsed as quickly as possible in clean water. If this is not done, the ware will be probably spotty. After the articles have been well rinsed, they should be carried in wooden pails under water, as quickly as possible, to the adjacent drying room D. Connection between the pickling room C and the drying room D is preferably made by a series of turntables N (Fig. 4). The drying of the plated parts is done in special centrifugal dryers O (Fig. 3), instead of in sawdust as heretofore. After the parts are dry they are usually covered with a colorless lacquer to prevent oxidation of the surface.

This article will be concluded in an early issue.—Ed.

A Few Facts Relative to the Polishing Wheel Industry

By JAMES J. MANDERSCHEID,
President, Advance Wheel Manufacturing Company, Inc., Chicago, Illinois.

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

OFTTIMES one comes in contact with men in the metal finishing trade who profess thoroughly to understand the art of polishing wheel manufacturing, and while these men are truly honest in their convictions, yet there may be something in the manufacture of this most important tool of the metal finishing industry that they do not fully understand; and in order to enlighten the reader of this article the writer wishes to point out a few facts with illustrations, what is being done not only to manufacture better polishing wheels, but to manufacture them at a price attractive to the buyer and still continue to introduce quality raw materials in the finished product.

JAMES J. MANDERSCHEID

To the layman it would seem that all there is to polishing wheel manufacturing is to take some stock, cut out a disc no matter how you cut it, glue it together with ordinary glue, bore a hole in it, and presto you have a polishing wheel. This method of polishing wheel manufacturing would pass in the old days when polishers were forced to make their own wheels, but times have changed, mass production and keen competition has done away with that method long time ago.

MUSLIN CLOTH POLISHING WHEELS (RAG WHEELS)

First let us take the old time "Rag Wheels" made of muslin cloth either bleached, unbleached, shirting or colored stock or hard shade cloth stock, made in different densities, hard, medium, soft, etc. The price of this wheel is determined by the stock introduced. The bleached and unbleached "Rag Wheels" are the most expensive while the rag wheel made of colored stock is the cheaper grade. All of the above "Rag Wheels" except the one made of shade cloth stock can be used for the same purpose if the weave of the cloth is the same.

Some work require a medium, some a hard and still others a soft "Rag Wheel." The ultimate consumers of this type of polishing wheel believe that the different densities are obtained by pressure. This is a misunderstanding. The only way the densities of "Rag Wheels" are controlled is first, in the case of a hard wheel to introduce thin sections of sewed muslin buffs, second, by close rows of sewing and third, by a short stitch, the pressure remains the same for all densities.

The medium "Rag Wheel" density is controlled by a heavier sewed muslin section than that used in the hard density wheel with the same width of sewing except that the stitch is longer.

The soft "rag wheel" density is controlled by the introduction of sewed muslin sections the same thickness as those introduced in the Medium "Rag Wheel" except that the rows of sewing are 3/8 inches apart or 1/2 inch apart, depending upon how soft the wheel should be. The 3/8 inch rows of sewing with a long and loose stitch is most commonly used.

It is impossible to control the density of any kind of polishing wheel of the disc type by pressure and still retain the desired face required for certain size work it is to be used on. If the density of this type polishing wheel is controlled by pressure why then does a 2 inch face wheel, after it comes from the press swell to 2¼ inches and sometimes to 2½ inches in face? If the density is controlled by the thickness of the section used and the sewing introduced then the wheel after it comes from the press remains the same size in face.

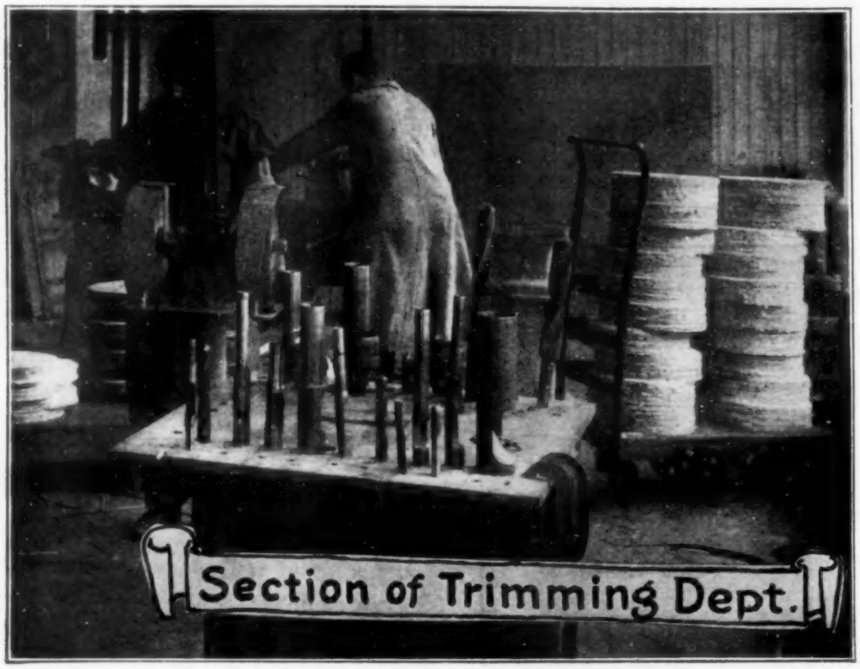
CANVAS POLISHING WHEELS

There are many types of canvas wheels manufactured today and because of this it is rather difficult sometimes for the polisher to select the kind of canvas wheel that is best suited for his work. Just as it is difficult for a man when eating in a restaurant to choose the kind of pie he would like for dessert, when in doubt he will order the old reliable "Apple Pie." So it is with canvas polishing wheels. When in doubt he will order the old reliable "Canvas Wheel" made of pure white woven cotton canvas, a general all around polishing wheel that can be used on white metal die castings, cast brass, aluminum, steel, monel

SEWING DEPARTMENT OF A LARGE WHEEL PLANT

metal, etc. This wheel is made in six different densities and because all metals are not alike in texture and are of different shapes these different densities are necessary.

The density of this wheel since it contains no sewing whatever is controlled by the introduction of a very thin disc of canvas in the case of a hard density, and a very heavy canvas where a soft density is desired.



LEFT—
HERE THE BUFFS
ARE TRIMMED
DOWN TO SIZE

On the first operation, or roughing out with number thirty to number forty-six emery, it is more economical to use the cheaper grade of canvas wheels known as sewed and cemented wheels made of a canvas approximately ⅛ inch in thickness three discs sewed into a section like a buff and then cemented to the required thickness of face. For finishing, this class of polishing wheel should not be used as it would not hold the fine grains of emery as it should nor does it have that cushion so necessary for fine finishing. The density of this wheel is controlled the same as the "Rag Wheels."

SPECIAL FACE SHAPES

In these days of large production, speedy delivery, etc., it is necessary for the manufacturer of metal parts to speed up his production wherever possible. In his polishing department he has found that if he has work of irregular shapes he can have his polishing wheels built to fit the shapes of the work to be polished instead of using different size face wheels. These polishing wheels are usually built from blue prints in order to avoid errors. The reader will be surprised to learn of the close specifications on some of these blue prints. For instance, in the polishing of a cam shaft groove a wheel ten inches in diameter with a three quarter inch face is generally used but the face is shaped to a 16½ degree angle on both sides of the face so that the straight part of the face will measure 21/64, 29/64, or 7/16 of an inch across. These are close figures especially when you consider that the stock used is either canvas or felt. Careful consideration must be taken for the space that the different grains of emery will take up when these blue prints are drawn. Then we have the different shapes of bumper bars of rounded shapes. The canvas wheel of the best quality is used on this work and the wheel is grooved to fit their respective shapes. There is no standard shapes for this class of work as some of the bumper bars require wheels 14 inches or 16 inches in diameter by 3 inch face grooved to a radius of four inches one quarter inch deep, while others require the same size in diameter and face but with a radius groove of 3⅜ inches making a depth of approximately 3/16 inches at the deepest point.

It is necessary for the polishing wheel manufacturer to employ men who are thoroughly familiar with this class of work, for it is an easy matter to make mistakes and should an error occur on a job made from a blue print, one can readily appreciate that wheels that are shipped and not made according to the customer's blue print will be returned to the wheel manufacturer which would practically mean a total loss. The tools for trimming these special shaped polishing wheels must be carefully made. There is no standard tool made for this class of work and a tool for one class of work is not good for another, so that each and every special shape must have its own shaped tool.

This article will be continued in an early issue.—Ed.

WHERE BUFF WHEELS ARE COMPRESSED

Ten Commandments of Prosperity

Leading Metal Manufacturer Comments on Charles M. Schwab's Rules for Making Prosperity Permanent

At the beginning of the New Year, the daily press carried the following set of ten rules, issued by Charles M. Schwab, steel maker and one of America's greatest industrialists, whereby the United States can continue to maintain its present era of great prosperity:

EDWARD O. GOSS

1. Pay labor the highest possible wage. Prosperity is intimately related to a liberal wage scale.

2. Treat labor as a business partner. Successful industry depends more on human relations than upon the organization of money and machines.

3. Conduct business in the full light of day. Public confidence and public suspicion may be separated only by a door.

4. Remember that the law of supply and demand is inexorable. And it also would be well to remember that there is no necessity for producing an excess.

5. Live and help live. Even prosperous industries cannot afford to have the backward industries too far behind the procession—prosperity to be permanent must be equally distributed.

6. Welcome new ideas. To establish permanent institutions we must always be prepared for change.

7. Never be satisfied that what has been achieved is sufficient. Smugness and complacency do not promote progress .

8. Operate business on the most economical basis. Price cutting, over-expansion, uneconomical methods of distribution are just as harmful to business and to the public as price fixing, monopolies and rebates.

9. Look ahead and think ahead. It is easier to avoid depressions than it is to cure them.

10. Smile, be cheerful and work upon the basis that the fundamental purpose of business is to promote the happiness of human beings.

Following the issuance of Mr. Schwab's formula for a continuance of prosperous times, THE METAL INDUSTRY requested several of the leading metal manufacturers for their opinions of the rules set down by the steel man. From most of them no statements were obtainable as we went to press.

E. O. Goss, president, Scovill Manufacturing Company, Waterbury, Conn., said: "I wouldn't add anything to what Mr. Schwab has said. I esteem Mr. Schwab as a friend and have a high regard for anything he says. I find myself in agreement with him on most matters. What he says sums up what I have already said [referring to a statement appearing elsewhere in this issue]. If everyone will go to work and keep at work there will be prosperity. If half the people are going to spend half their time watching the stock market reports, we aren't going to have prosperity. I agree with everything Mr. Schwab says and do not see how it can be improved upon."

A New Brass Giant

As announced briefly in our December issue, a new brass manufacturing combination has been organized under the name of Republic Brass Corporation. This company embraces the following well known brass manufacturing mills: Taunton-New Bedford Copper Company, Taunton, Mass.; Rome Brass and Copper Company, Rome, N. Y.; Dallas Brass and Copper Company, Chicago, Ill.; Michigan Copper and Brass Company, Detroit, Mich.; Higgins Brass and Manufacturing Company, Detroit, and Baltimore Copper Mills Division of General Cable Corporation, Baltimore, Md.

Each of the constituent parts will continue to operate under its own name as a division of the Republic Brass Corporation, with the same personnel and management as heretofore. Aside from combining financial strength, the advantages of this union of interests are given as: better raw material control; united manufacturing experience; improved and broadened engineering, technical and research facilities; wider diversification of products; more complete stocks and added mill capacity to draw upon from plants of favorable geographical location.

The officers of this corporation are as follows:

Chairman of the Board—**Barton Hazelton,** president of the Rome Brass and Copper Company.

President—**George H. Allen,** president of the Michigan Copper and Brass Company.

Directors will include:

Alfred P. Sloan, president of the General Motors Corporation; **Walter P. Chrysler,** president of the Chrysler Corporation; **Walter C. Baylies,** chairman of the Executive Committee, The Edison Electric Illuminating Company of Boston; **Francis H. Brownell,** chairman of the Finance Committee, American Smelting and Refining Company; **H. T. Dyett,** vice-president and director, General Cable Corporation; **Samuel L. Fuller,** Kissel, Kinnicutt and Company; **C. S. Mott,** vice-president, General Motors Corporation; **W. H. Peirce,** vice-president, American Smelting and Refining Company; **Walter Robbins,** president General Cable Corporation; **R. W. Straus,** vice-president, American Smelting and Refining Company. Photos of the principals were not obtainable.

The capitalization of the corporation will consist of \$10,000,000 in first mortgage 6 per cent bonds, \$10,000,000 in 7 per cent preferred stock, 250,000 shares of no par value class A stock and approximately 510,000 shares of no par value common stock. The combined properties of this corporation will have a physical plant value of about \$20,000,000; current assets of approximately \$19,000,000 and current liabilities of \$2,400,000. It is stated that the American Smelting and Refining Company will hold about 25 per cent of the voting power.

Here is the third great merger in the brass business. The first was the formation of the American Brass Company which linked together mills in Waterbury, Ansonia and Torrington, Conn., Buffalo, N. Y. and Kenosha, Wis. The second great step was the acquisition of this company by the Anaconda Copper Company. This marked the entrance of the copper producers into the fabricating field. Expansion then moved ahead at a much more rapid pace, the American Brass Company taking over the mill at Hastings, N. Y., another in New Toronto, Canada, and

the last in Detroit, Mich. These, added to the cable plant already operated by the Anaconda Company in Montana, presented the most formidable array of capacity and facilities ever known in the metal manufacturing industry.

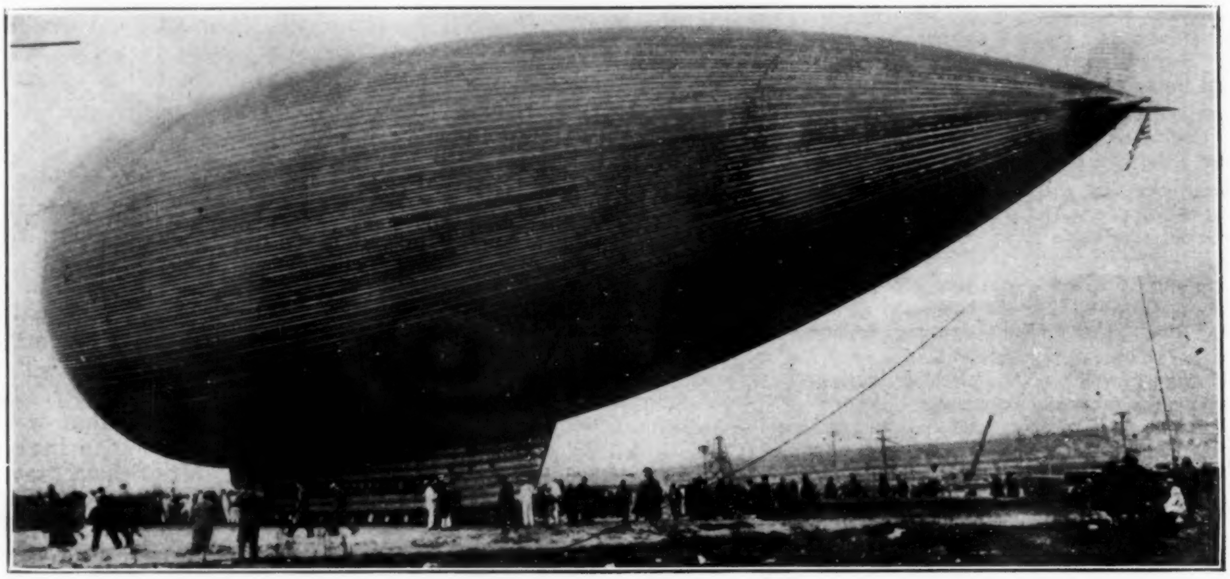
Rumors have been going around for years touching every brass company of importance. Undoubtedly negotiations are being carried on by several copper producers of prominence with every large independent brass mill. The Republic Brass Corporation, however, is the first to achieve actual organization since the Anaconda-American Brass merger. It represents a group second only to the American Brass.

Reports have been circulated that several of the remaining brass mills are to be gathered together under the wing of still another great copper company, but no details have been released for publication as yet.

New All-Metal Dirigible

The first all-metal dirigible airship has been built by the Slade Aircraft Corporation at Glendale, Calif. The illustration of this ship, after being wheeled for the first time from its hangar, shows a huge crowd watching the motor tests which were conducted on the craft recently. This airship is said to be a departure from all previous ships in both construction and motive power. Its immense size is obvious by comparison with the people around it.

The development of all-metal airships is a striking example of the possibilities in store for high strength aluminum alloys in the flying machine manufacturing industry.



NEW ALL-METAL DIRIGIBLE. AN IDEA OF ITS HUGE SIZE CAN BE GAINED BY COMPARISON WITH THE PEOPLE STANDING NEARBY

Silver Solution

Q.—I am sending you a sample of a silver solution which has given me some trouble. This solution will not plate evenly; some of the work comes out bright and yellowish, while the rest comes out a dull white, which is what we want. There are sometimes different patches on the same article. When the yellowish color is produced, it turns white when rinsed in hot water, but the lustre remains. We use the solution for a general line of jewelry and novelties, and we do not wish a bright plate.

A.—Analysis of solution:

Silver	4.52 ozs.
Free cyanide	3.28 ozs.

Solution is low in free cyanide for the metal content. It is customary to carry a free cyanide content 10 per cent higher than the metal for usual class of work. Would advise adding 2 ozs. of sodium cyanide for each gallon of solution.

The condition of the deposit that you mention is common with some silver solutions. We do not know the cause, but the theory has been advanced that it is caused by the formation of a subsalt of silver during deposition. It may be overcome to a certain extent by leaving work remain in the silver solution a short time with the current off and by dipping the work in a hot cyanide solution; also, by bleaching the work in hot water.

—OLIVER J. SIZELOVE.

Old English Bronze

Q.—Please advise us how an old English bronze, otherwise known as Flemish bronze, may be obtained on brass or steel goods.

A.—To produce old English bronze on iron it is necessary to brass plate the iron with a fairly heavy deposit of brass and then to scratch brush. If the base metal is brass, polish or bright dip and clean work same as for plating.

Immerse in following solution until a smut is produced and scratch brush dry or relieve with rag wheel and pumice, depending upon character of finish desired:

Copper sulphate	8 ounces
Potassium chlorate	2 ounces
Hyposulphite soda	8 ounces
Water	1 gallon

Use solution boiling hot.

—OLIVER J. SIZELOVE.

THE METAL INDUSTRY

With Which Are Incorporated The Aluminum World, Copper and Brass, The Brass Founder and Finisher, The Electro-Platers' Review

Member of Audit Bureau of Circulations and The Associated Business Papers

Published Monthly—Copyright 1929 by The Metal Industry Publishing Company. Entered February 10, 1903, at New York, N. Y., as second class matter under Act of Congress March 3, 1879

SUBSCRIPTION PRICE, $2.00 Per Year. SINGLE COPIES, 20 CENTS. Please Remit by Check or Money Order; Cash Should Be Registered

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Vol. 27 New York, January, 1929 No. 1

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THE METAL INDUSTRY is regularly indexed in the Industrial Arts Index

Edition this Month, 6,500 Copies. Buyer's Guide, Advertising Page 105

Editorial

Metal Industry Reviewed for 1928—Outlook for 1929

During the year 1928, a President of the United States was elected. At the beginning of that year, predictions were tempered with caution; 1927 had been only fair; consequently 1928 was looked forward to with hope but also with doubt. It followed a year of only passably good business, and moreover it was a presidential year. The chances were that it would be fairly good but no guarantees could be given.

The results were startling. For the first half of the year, the predominant attitude was that of caution and consequently light dealings; the second half year rose suddenly in unprecedented fashion, rounding out the twelve months in such a way as to make it one of the outstanding years in American industry; this, in spite of a price structure, which either fell slightly in some branches or remained steady. We had the extraordinary phenomenon of great prosperity without inflation.

Two or three industries were exceptions, however. The coal industry was consistently weak. Textiles remained in the doldrums and agriculture, while perhaps slightly better than in 1927, improved very little.

METAL PRICES IN 1928.

No general statement can be made to apply to all metals in 1928. Each had its own peculiarities and history. Copper had a year of consistent and unbroken rise. Beginning at about 14c, per pound it moved up steadily, closing the year at 16.75. The formation of the various trade organizations in the copper field is now having its effect and copper is reaping the benefit of sound and effective control. The real test of such control is still before the industry, however. Will copper be kept within bounds? Or will it be allowed to go to heights which will make it uneconomic for general use? The general impression is that producers are anxious to keep it from going too high. It is to be hoped that consumers will co-operate with them.

Zinc has done fairly well, ending the year on the upstroke, at 6.45 for brass special, St. Louis. Lead has been spotty, being affected by various gyrations in its consuming industries such as radio and automobiles. The net change, however, has been small although the major part of the year has been rather below the opening, and closing (about 6.50). Tin continued to be reactionary, beginning the year at about 57, going down as low as 47 and closing below 50. As usual, we can give no reason for what tin did except to say that it was probably overproduction, as consumption has been very high. The future seems to be indeterminate.

Aluminum was unchanged at 24.30 cents, being carefully controlled by the leading producer. Nickel was also stationary. Silver moved aimlessly from about 57 to 60 cents per ounce, and back again. Platinum, beginning the year at around \$80 per ounce, declined steadily to less than \$70.

The metal trading business has been supplied with a new medium, the National Metal Exchange, which is being watched with great interest to see how it will affect the American metal business.

TECHNICAL PROGRESS

In the metal fields greatly increased interest was evinced in secondary metals. A symposium on this subject was held at the November meeting of the Institute of Metals Division, which, it is hoped, is only the beginning of the opening of this industry to new ideas and an interchange of information.

It is interesting to note that an old and well known metal product, silver solder, is gaining rapidly in favor. Its chief point of interest at this moment is in its use in airplanes where it is valued for its reliability, and its expense plays a comparatively small part in the problem. Silver solder consists of silver, 40-80%; copper, 2.5-30%; zinc, 0 to 17.5%; tin, 0 to 6%.

The Bureau of Standards issued a circular (No. 252) describing the development of rubber core binders, to be used in the foundry. While such core binders are not commercially perfected as yet, much is hoped for them and work is going ahead on a large scale to test their value in practical foundry work.

An increase in the use of zinc has been noted in the growth of the die casting industry. This is undoubtedly due to the improved zinc-base die casting alloy, developed during the past two years, with the composition, zinc, 92.9; aluminum, 4; copper, 3; magnesium, 0.1. Lead has had no unusual feature except the growth in the use of the Harris and Thompson process for reclaiming lead from scrap.

Aluminum is reaching out in all directions. Last year we had Alclad, a heat-treated aluminum base alloy with a smooth, non-porous surface of very pure aluminum. This year we have, from abroad, aluminum coated steel sheets, made by rolling and sweating a coat of aluminum on the steel sheet. In addition, the airplane industry has stimulated the production and improvement of high strength aluminum alloys, as this field offers a large outlet for aluminum, due to its light weight.

In electroplating there has been a tremendous gain. Chromium is still the favorite of the general public and everyone who has not already done so, is either putting in or considering chromium plating.

Rust proofing has also claimed increased interest. The whole technology of plating has moved ahead and the industry in now "sold" on chemical control, electrical control, temperature control, agitation, filtration, sounder and better-built equipment, purer chemicals and anodes and heavier coatings. The past year has seen chromium plated in full automatic conveyors. It has seen nickel plated directly on aluminum so that it will stick. It has seen the beginning of electroplating of aluminum out of organic solutions onto other metals. The American Electroplaters' Society and Bureau of Standards are still working on the problem of spotting out, chromium plating, cyanide solutions and others. We can think of no faster moving or more rapidly improving industry than electroplating.

ECONOMIC DEVELOPMENTS

The economics of the metal industries are almost synonymous with the economics of their customers, who can be grouped to a very great extent under a few headings. Electrical manufactures, automobiles, building trades, railroads, jewelry and novelties usually cover most of the metal consuming capacity of the United States. A newcomer arrived, however, a few years ago and has been growing by leaps and bounds, particularly during the last year or two, namely flying machines. Air transportation is still a small industry as industries go in the United States, but it is being more closely watched than

any other, of its size, in our national history. So far as metals are concerned, aluminum bids fair to take most of the business. Nevertheless, other metals will be used, if even to a small extent.

The motor industry had one of the biggest years of its history and consequently rolling mills and foundries flourished with it, as did also electroplating, since the new cars were all beautifully trimmed and finished. The railroads bought comparatively little but the larger roads are now entering upon a program of electrification which will consume millions of pounds of copper; also numerous new electric locomotives of which metals will form an indispensable part. The building trade has refused to slacken. The electrical industry had one of its most prosperous years. These facts account for the prosperity of the metal industries.

Nevertheless, with the mills running to capacity and orders booked ahead, profits were comparatively small. Competition was still keen and the margins were held down. The outstanding problem of the industry was to cut costs, and in addition to plant improvements, this problem was met in another manner—by mergers. To record all the mergers of the year in these columns would be impossible for lack of space. The outstanding combination, however, was the formation of the Republic Brass Corporation, in which the American Smelting and Refining Company was the prime mover, and gathered altogether under one name, The Baltimore Sheet Mill of the General Cable Company; The Taunton-New Bedford Copper Company; Dallas Brass and Copper Company; Michigan Brass and Copper Company; Higgins Brass and Manufacturing Company; Rome Brass and Copper Company.

Iron and steel are still the largest single item in metal production, totaling in value, over $645,000,000 in 1927. It will be noted, however, that the non-ferrous metals totaled over $670,000,000 in 1927, making them all together an industry of such proportions as to compare very favorably with iron and steel. The metal industries cover a large field.

A step of considerable economic importance to the metal business was taken by the American Society for Testing Materials, in organizing a special committee for the promotion of the general use of specifications for copper alloys in ingot form. This committee will enlist the co-operation of the Non-Ferrous Ingot Metal Institute in educating the consumers to standard alloys, standard requirements and specifications, with as few as possible variations from these standards. The trade papers which are represented on this committee, will aid this movement by publishing prices in accordance with these standard specifications when they are developed; in other words, differentiating in prices between standard and non-standard alloys.

NECROLOGY

Among those of prominence in the metal industries who passed away during 1928, were the following.

George W. Trout, vice-president North and Judd Manufacturing Company, New Britain, Conn.

Edward T. Wittman, president Atlas Brass Foundry Company, Columbus, Ohio.

Harvey Hubbell, president, Harvey Hubbell, Inc., Bridgeport, Conn.

Walter L. Abate, brass finishing editor, The Metal Industry.

Mrs. **Maude A. Magnuson,** vice-president, Magnuson Products Corporation, Brooklyn, N. Y.

Walter Bauer, president, Pyrene Manufacturing Company, Newark, N. J.

Charles F. Kinsman, chairman of the board, Sterling Bronze Company, New York.

Daniel Kennedy, president Kennedy Valve Manufacturing Company, Elmira, N. Y.

John Swift Holbrook, director, Gorham Manufacturing Company, Providence, R. I.

Charles H. Woodison, vice-president, E. J. Woodison Company, Detroit, Mich.

Harmon W. Hendricks, president, Hendricks, Brothers, New York.

Frank H. Hoffman, manager, Detroit Copper and Brass Rolling Mills, branch of the American Brass Company, Detroit, Mich.

Henry K. Benson, formerly president Benson Rolling Mills Company, Glen Ridge, N. J.

Charles W. Leavitt, formerly head of C. W. Leavitt and Company, New York.

George W. Niedringhaus, chairman of the board, National Enameling and Stamping Company, Granite City, Ill.

George Edward Trumbour, Butler, N. J.

Walter F. Field, vice-president, General Cable Corporation, and president Safety Cable Company, Bayonne, N. J.

Major Joseph A. Steinmetz, Janney-Stein Company, Philadelphia, Pa.

Gustav H. Koven, L. O. Koven and Brother, Jersey City, N. J.

Theodore W. Foster, president, Theodore W. Foster and Brothers Company, Providence, R. I.

Frank G. Drew, chairman of the board, Winchester Repeating Arms Company, New Haven, Conn.

Clarence B. Hodges, director, Detroit Lubricator Company, Detroit, Mich.

John R. Searle, formerly president Michigan Smelting and Refining Company, Detroit, Mich.

William T. MacFarlane, formerly president Bridgeport Crucible Company, Bridgeport, Conn.

Van Loan Whitehead, chairman of the board, Whitehead Brothers Company, Buffalo, N. Y.

Thomas A. DeVilbiss, president DeVilbiss Company, Toledo, Ohio.

P. Samuel Rigney, director Roessler and Hasslacher Chemical Company, New York.

Joseph Horton, British correspondent The Metal Industry, Birmingham, England.

OUTLOOK FOR 1929

The outlook for 1929 is good. Opinion is practically unanimous that the first six months of 1929 are assured of a high rate of activity. The second half of the year is too far off for most business men to guess at, but they look forward to it without apprehension. The large electrical companies like the General Electric and Westinghouse expect to maintain their rate of increase, from 8 to 10 per cent. Automobile manufacturers look forward to another of their big years. No estimates of building are available at this time, but the quantity of metals going into buildings has increased so markedly during the past few years, that even if there should be a falling off in building, the metal industries would not be seriously affected, as the total consumption of metals would still be much higher than in former years. The railroads have been a doubtful quantity for a long time; in many ways disappointing. As mentioned above, however, there are some extraordinarily extensive programs of electrification being undertaken which should make themselves felt among producers and manufacturers of metals.

The sore spots of industry are the coal and textile industries and agriculture. If these fields could be improved, it would mean unprecedented prosperity for the United States as a whole.

To The Metal Industry, entering upon its 27th year, the prospects for 1929 seem to be decidedly bright.

Correspondence and Discussion

Rubber Core Binders

To the Editor of The Metal Industry:

Under date of September 4, 1928, the Bureau of Standards at Washington published Letter Circular 252, indicating that certain rubber products were of value to the foundry industry when used as core binders.

This circular letter resulted in a multitude of inquiries pouring into both the bureau and to this organization. Since it is our desire to assist in every possible manner in commercializing these new developments for the benefit of the foundry industry, we feel it is only proper that you should be advised of the present status of this matter. We are, therefore, directing this letter to you so that you may know what is being done and so that you may plan to take advantage of this new development in the near future.

The work done by the Bureau of Standards was obviously done from a metallurgical viewpoint. It was felt that a cooperative program based on both the metallurgical and rubber viewpoints should bring this development to a commercial stage more rapidly than if independent programs were instigated. This corporation has, therefore, made arrangements to cooperate with the Bureau in a research program and it is hoped the results of these combined efforts will produce in the near future a product which will give to the foundry industry the values indicated in the circular of September 4. At the moment indications are that it may be possible to offer such a product early in 1929.

We believe you will understand our desire to thoroughly check all angles of the situation before offering such a product, and can state definitely we shall be very glad to communicate with you further in regard to your inquiries at the earliest possible moment.

Akron, Ohio, December 3, 1928. THE B. F. GOODRICH RUBBER COMPANY, J. R. Silver, Development Engineer.

Shop Problem Section Helpful

To the Editor of The Metal Industry:

We wish to thank you for answering our recent question in your shop problem department. We have found the information very helpful in figuring on a contract for some bank work in this city. Permit us to compliment you on your ability to solve difficult problems and to offer our services at any time we can be of aid to you.

Belleville, Ill., December 22, 1928. JOHN H. SAX.

Platers' Convention for Washington

To the Editor of The Metal Industry:

Knowing that the American Electroplaters' Society will meet in Detroit, June 8th to 11th, I have talked to Mr. E. B. Allen, of Washington, relative to the possibility of selecting Washington, D. C., for their 1930 convention of the Electroplaters. Mr. Allen suggested that I communicate with you, saying that he did not know whether Washington had a chapter of the organization or not. He also suggested that we communicate with Dr. Blum at the Bureau of Standards, and W. F. Barrows, who is also in Washington.

Mr. Allen seemed to think that Washington would be a suitable city for the convention, due to the educational advantages which it would have for the members, as they could get first hand information as to how the Bureau of Standards operates, etc.

I believe Mr. Proctor, one of your associate editors, has considerable weight in the organization, more than other individual members, as he travels around quite a bit and keeps in contact with the various members of the organization. Would he furnish me with the information as to whether Washngton, D. C., has a chance for this convention or not? I will appreciate any information you can furnish me in this matter.

Washington, D. C., December 14, 1928. JOSEPH H. PULLIAM.

Dear Mr. Pulliam:

Your very interesting letter of December 14th addressed to The Metal Industry has reached the writer's hands. As you are well aware, the next convention of the American Electroplaters' Society will be held in Detroit and so far as the convention in 1930 is concerned, it is somewhat too early to come to any decision as to where the convention might be held.

As we now have a branch of the American Electroplaters Society in Washington, there is no reason why the convention should not be held in Washington in 1930. I personally believe that it will not be a difficult matter to hold the convention in Washington. I am very familiar with the Capital City and believe it would be a splendid place.

I appreciate your kind comments as to the weight the writer is able to bring into a discussion of this subject and shall do all that I possibly can as I journey around to have this matter impressed upon the minds of the men who will be the factors in arriving at the 1930 convention city. If you have been in touch with Dr. W. Blum of the Bureau of Standards, you have no doubt learned the address of the Washington Branch of the American Electroplaters' Society.

CHARLES H. PROCTOR.

Plating Room Floors

To the Editor of The Metal Industry:

Many thanks for your prompt reply and the report on a formula for plating room floors, drawn up by your expert. We appreciate greatly your kind coöperation with us in this matter.

Philadelphia, Pa., December 11, 1928. INTERNATIONAL CHEMICAL COMPANY, F. P. Bye, Jr., Sales Department.

Would Subscribe for 20 Years!

To the Editor of The Metal Industry:

Enclosed you will find check for two dollars for two years' subscription to your valuable book, The Metal Industry. If was sure to live long enough, I would forward twenty dollars.

Syracuse, N. Y., December 9, 1928. P. C. KRAMASCIK.

New Books

Practical Color Simplified. By William J. Miskella. Published by Finishing Research Laboratories, Inc., Chicago, Ill. Size, 6¼ x 9⅜; 113 pages; price, $3.50.

A complete and authoritative work on the theory and practice of lacquering, enameling, coloring and painting, this handbook constitutes the sum of a wide variety of experience of the author over 23 years of practical work and much study. The book covers every branch of color, and treats of mixing, harmonizing, choosing, matching, lighting, testing and designation. There can be no doubt that this book will find a ready response in the finishing industry. It contains much practical knowledge which every finisher might well have use for, and is written in a simple, lucid style which makes it highly desirable for the non-technical as well as the technical man. Not the least important feature of the book is three charts, in color, by means of which color choosing, complimentary mixing and mixing harmony and lighting are beautifully illustrated.

Mineral Industry. Edited by G. A. Roush. Published by McGraw-Hill Book Company, Inc., New York City. Size 6½ x 10.

This book has been issued annually since 1892. It is generally recognized as the authority on mineral statistics, prices, and other data relating to such matters as new research, discovery, and innovations of all kinds that are made each year in connection with the production and use of minerals. The book is a compilation of chapters on separate divisions of the mineral industry, each by an authority on the subject.

It is ably edited and this year, as in the past, it is of first importance to those who are interested in the sale, study or use of minerals.

Time and Motion Study and Formulas for Wage Incentives. By Stewart M. Lowry, Harold B. Maynard and G. J. Stegemerten. Published by McGraw-Hill Book Company, Inc., New York City. Size, 9¼ x 6; 377 pages; price, $4.00.

The authors of this work have obviously devoted a great deal of time to their subject, and from their study have emerged well equipped to give the industrial world a very exhaustive work on a most important subject. The book describes time and motion study as it is carried on by experts, under practical working conditions, with the view of determining the value of men's labor. Every angle of approach to the problem has been taken and formulas have been devised for the introduction of systems in a variety of industries, under normal conditions of operation. All of these formulas have been tried by actual use in plants and all have been found satisfactory. The authors have given attention to such major factors as the expense of installing a system and the effect of such a system on the worker's attitude, and have kept in mind always the need of avoiding interruptions in production while a system is being tested or installed.

Proceedings of the Institute of Metals Division, 1928. Published by Institute of Metals Division, American Institute of Mining and Metallurgical Engineers, New York City. Size, 9¼ x 6; 836 pages; price, $6.00.

This volume is uniform with the preceding issues, and covers the papers presented before the Institute of Metals Division meetings at Detroit, Mich., in September, 1927, and at New York City, in February, 1928. The usual intelligent treatment in editing, preparation for press, binding, etc., have resulted in another fine volume of papers which should be very important to metallurgists and others who are interested in metals. The papers have been divided into three groups: general, secondary metals, and precious metals. There are lists of the Institute's officers, directors and committees.

The Journal of the Institute of Metals. Volume XXXIX, 1928. Edited by G. Shaw Scott. Published by The Institute of Metals, 36 Victoria Street, Westminster, London, S. W. 1, England. Size, 5½ x 8½; 826 pages; price, 31s. 6d.

The new half-yearly volume of the Journal of the Institute of Metals is interesting in that it contains an account of the proceedings at the twentieth annual general meeting of the Institute, and includes several plates which illustrate the fine new offices of the Institute, the opening of which synchronised with the annual meeting. The papers that were presented at that meeting, and are now reproduced in full with verbatim discussions, strike quite a cosmopolitan note, including as they do the work of metallurgists of Japan, India, the United States and Germany, as well as of Great Britain.

The range of communications now reproduced is very wide, including such subjects as the composition of old Roman lead, an example of Roman copper "soldering" and welding from Uriconium, the quenching and tempering of brass, bronze, aluminium-bronze and standard silver, the alloys of zirconium, the relative corrodibilities of ferrous and non-ferrous metals and alloys, the season-cracking of small arms cartridge cases during manufacture, the dilatometric study of light metals, behaviour of metals and alloys during hot-forging, and the deterioration of lead cable sheathing by cracking and its prevention. In addition, there are to be noted two special communications—the annual May Lecture, by Professor C. H. Desch, on "The Chemical Properties of Crystals," and the inaugural address by the new president, Dr. W. Rosenhain. The address is a complete justification of the scientific metallurgist. In the course of his discourse Dr. Rosenhain makes crystal clear what has often appeared forbidding to the uninitiated—the equilibrium diagram, that most fundamental aid to the understanding of the alloying process.

Patents—Law and Practice. By Oscar A. Geier. (Fourth Edition.) Published by Richards and Geier, 274 Madison Avenue, New York City. 46 pages; distributed free.

This is the fourth edition of a comprehensive book on patent laws, methods of obtaining patents, trade marks, copyrights, etc., and all pertinent data. The book, which is distributed gratuitously to all interested persons or firms, is neatly bound in cloth covers and should interest anyone who is in any manner concerned with the information mentioned.

Standard and Tentatively Adopted Methods of Testing and Grading Foundry Sands. The American Foundrymen's Association, 222 West Adams Street, Chicago, Ill. 94 pages; 31 illustrations; 6 x 9; paper covers; price, $3.00.

This publication is a revision of the foundry sand test methods issued by the Joint Committee on Molding Sand Research in 1924, and contains in addition descriptions of testing procedures developed since 1924. Controlling specifications are given, with general information as to methods of conducting tests and details of construction of apparatus which has been found satisfactory for performing the tests. The book is divided into five sections: foreword; standards; tentative standards; list of manufacturers of special testing apparatus; bibliography of articles on molding sand issued since 1922.

Accelerated Laboratory Corrosion Test Methods for Zinc-Coated Steel. By Edward C. Groesbeck and William A. Tucker. Bureau of Standards, Journal of Research, August, 1928.

The merits of two certain types of accelerated laboratory testing methods for evaluating the indicated life of the coating on hot-dip zinc-coated sheet steel were compared. The two methods studied were the simulated atmospheric corrosion, using a moist gaseous mixture of sulphur dioxide, carbon dioxide, and air, and the spray, using normal solutions of sodium chloride and ammonium chloride separately. A consistent relationship between the "life" and weight of the coating was shown by the results. The time required for the breaking down of the coating was considerably less for the first method than for the second. The coating was corroded, in the first method, in a progressive manner over the entire surface and similar to that reported for galvanized materials corroded in the atmosphere under service conditions, and in the second method, in a local and capricious manner. No attempt was made to interpret the experimental results in terms of service life in various types of atmospheres prevailing in different climates. Any satisfactory attempt at such an evaluation will have to await the results of long-time field tests on zinc-coated products carried out under several typical atmospherical conditions obtaining at different locations. The presence or absence of about two-tenths of 1 per cent copper in the steel base produced no apparent effect on the results. Tests were also made on specimens which had been annealed for the purpose of converting the zinc coating into an iron-zinc alloy.

Chemical Engineering Catalog. The Chemical Engineering Catalog Company, Inc., 419 Fourth Avenue, New York City. 13th edition, 1928. 1107 pages; 8½ x 11½.

This volume is the standard reference work on equipment for chemical engineers, works managers, purchasing agents and operating engineers in plants where chemical processes are used. It is a compilation of condensed catalog data, with classified indexes of equipment, supplies, chemicals, materials, etc., bound into one large but convenient volume. It is a huge mass of catalogs reduced to one book by a competent committee appointed by the American Institute of Chemical Engineers, the American Chemical Society and the Society of Chemical Industry. The book contains, in addition to the information stated above, a technical and scientific books section which catalogs and describes briefly a very complete list of books in English on chemical and related subjects.

Government Publications

Publications listed hereunder are obtainable from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., at the prices given, unless otherwise noted.

Proposed Master Specification for Aluminum Alloy Tubes. Federal Specifications Board, care of Bureau of Standards, Washington, D. C., Free, from the Board.

This master specification, proposed for use by all Government departments and establishments purchasing aluminum-manganese alloy tubes, is issued for criticism by manufacturers and others interested. Such criticism should be received by the Board not later than six weeks from December 12, 1928, the date of issue of the proposed standard if they are to receive attention of the technical committee considering the subject.

In brief, the specification covers one grade of aluminum-manganese tube, in the following tempers: A, soft; B, half-

hard; C, three-quarters-hard; D, hard. Other requirements are: solid drawn seamless; no scrap except that of known and approved composition to be used; tubes shall be sound, smooth, clean, without seams, laminations, grooves, laps, blisters or other injurious defects, and of uniform quality. Chemical requirements: Manganese, 1 to 1.5 per cent; copper, 0.2 per cent max.; aluminum, 97 per cent min. Physical properties include certain hardnesses for various tempers. Certain tolerances on nominal outside diameters are given, as are wall thicknesses, lengths, limits of straightness, methods of inspection and tests, packing and marking requirements and other data.

Simplified Practice Recommendations. Department of Commerce. No. R56-28 superseding R56, on **Carbon Brushes and Brush Shunts,** 10 cents; No. R90-28, on **Hacksaw Blades,** 5 cents.

Commerce Yearbook of Foreign Countries. Department of Commerce, Bureau of Foreign and Domestic Commerce. A source of information on current trends in international industry and trade. This is Volume II for 1928 and follows Volume I which deals with United States trade. Together they cover trade and industry of the world for 1928, giving authentic data as to volume of production, exports, imports, comparative world statistics, reviews of individual countries' trade, production, finance, currency and exchange, price movements and various other details. Price, $1.25; 750 pages, 10 colored maps, 60 charts. Can be procured from Government Printing Office or from any branch office of the commerce bureau.

Mineral Resources of the United States, 1927--Part 1. Various pamphlets, each part of what will later be a complete book covering all minerals. Mercury in 1927; Antimony in 1927; Abrasive Materials in 1927. Each 5 cents.

Cooperative Part-Time Education. Federal Board for Vocational Education. Bulletin No. 130, on the present status of cooperative schools and classes in the United States, with suggestions as to methods by which such work may be organized. Price, 10 cents.

Bauxite and Aluminum in 1927. By James M. Hill, Bureau of Mines, U. S. Department of Commerce. Pages 7 to 24 of Mineral Resources of the United States, 1927—Part I. Price 5 cents.

Platinum and Allied Metals in 1927. By James M. Hill, Bureau of Mines, U. S. Department of Commerce. Pages 25 to 38 of Mineral Resources of the United States, 1927—Part I. Price, 5 cents.

Commercial Forms. Simplified Practice Recommendation R37-28 (superseding R37). Bureau of Standards, Department of Commerce. Covers invoice, inquiry and purchase order forms. Price, 5 cents.

Steel Lockers. Simplified Practice Recommendation R35-28 (superseding R35). Bureau of Standards, Department of Commerce. Covers single, double and multiple tier lockers. Price, 5 cents.

Die-Head Chasers. Simplified Practice Recommendation R51-28 (superseding R51). Bureau of Standards, Department of Commerce. Covers self-opening and adjustable die-head chasers. Price, 5 cents.

Roofing Ternes. Simplified Practice Recommendation R30-28 (superseding R30). Bureau of Standards, Department of Commerce. First revision of this publication. Price, 5 cents.

Copper in 1926—General Report. By C. E. Julihn and Helena M. Meyer. Bureau of Mines, Department of Commerce. Pages 559 to 615 of mineral resources of the United States, Part I. Price, 10 cents.

Technical Papers

A Study of the Production of Chromium Surfaces for Retarding the Corrosion of Nickel at High Temperatures. By George F. Sager. A thesis submitted to the faculty of the Rensselaer Polytechnic Institute, Troy, N. Y. Published by the Institute.

The thesis is abstracted as follows: Sufficiently heavy chromium plates protect nickel against corrosion by sulphur dioxide. Surfaces of nickel-chromium, produced by diffusion of electrodeposited chromium or by chromizing mixtures, are, however, superior, since they preserve their protective properties through considerable cold working. Attempts to roll duplex ingots into wire failed.

Bureau of Standards Journal of Research. Vol. 1, No. 1, July, 1928. Published by the U. S. Bureau of Standards, Washington, D. C.

Contains five papers, as follows: Accelerated tests of organic protective coatings, by Percy H. Walker and E. F. Hickson; Measurement of the tread movement of pneumatic tires and a discussion of the probable relation to tread wear, by W. L. Holt and C. M. Cook; Absolute methods in reflectometry, by H. J. McNicholas; Analysis of bauxite and of refractories of high alumina content, by G. E. F. Lundell and J. I. Hoffman.

Submerged Corrosion Testing, by H. O. Forrest, J. K. Roberts and Newell Hamilton. Paper presented before Division of Industrial and Engineering Chemistry, American Chemical Society, Swampscott, Mass., September, 1928. Abstract:

It is generally recognized that the formation of protective films of rust and scale on metal surfaces during corrosion may play a very important part in the further progress of corrosion. Any laboratory test which is expected to give results of a reliable nature in natural water corrosion must take this factor into consideration. The type of rust film formed may be affected both by the corroding medium and by the metal under test. A method of testing is described in which a study of these factors is embodied, in addition to the consideration of oxygen concentration, velocity, and temperature usually studied. The corrosion rates reported from tests of this type indicate the average rate of penetration of the metal after steady conditions have been attained, hence give corrosion rates numerically comparable to those experienced under service conditions.

The Effect of Inhibitors on the Acid Solution of Copper and Copper Alloys, by H. O. Forrest, J. K. Roberts and B. E. Roetheli. Presented before Division of Industrial and Engineering Chemistry, American Chemical Society, Swampscott, Mass., September, 1928. Abstract:

The addition of inhibitor materials greatly diminishes the corrosion of copper and copper alloys in concentrated hydrochloric acid. In more dilute acids the effect of inhibitors is not so marked. In acid ranges in which inhibitors are effective, hydrogen evolution is quite rapid even in the case of copper. These effects support the belief that the mechanism of the protective action of inhibitor materials is the deposition of an adsorbed layer of inhibitor which decreases the area effective for depolarization by the formation of molecular hydrogen.

Factors Affecting the Relative Potentials of Tin and Iron, by E. F. Kohman and N. H. Sanborn. Presented before Division of Industrial and Engineering Chemistry, American Chemical Society, Swampscott, Mass., September, 1928. Abstract:

In a previous paper we have shown that contrary to long previously accepted views, tin is less noble than iron in canned fruits which generally give rise to hydrogen swells and perforations. Our data show that one important factor making tin less noble than iron is its tendency to be thrown out of solution by some component of the fruits. In berries this is most strikingly caused by the protein in the seeds. In other fruits and in berries also the pulp has a similar effect.

Our data also give basis for our previous statement that corrosion is not in the same proportion as the acidity of the fruit. In fact, it may be in inverse proportion, the fruits of lower acidity causing the greater amount of corrosion.

Methods of Electric Welding, by Industrial Heating Committee, National Electric Light Association. Serial report for 1927-1928. Price, 15 cents.

This paper covers the following subects: Electric Arc Welding; Resistance Welding; Atomic Hydrogen Welding; Electric Welding Equipment; Materials Suited to Welding; Thickness; Types of Electrically Welded Joints; Automatic Welding Head; Applications.

Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

ASSOCIATE EDITORS { JESSE L. JONES, Metallurgical / WILLIAM J. PETTIS, Rolling Mill } W. J. REARDON, Foundry / P. W. BLAIR, Mechanical CHARLES H. PROCTOR, Plating Chemical

Cleaning and Plating Solutions

Q.—would you kindly give me a formula for cleaning and plating white metal at the same time? Also, a sweet copper solution for plating the same, and an acid solution for acid copper tank?

A.—Unfortunately you do not give the composition of the white metal you desire to copper plate in the three types of solutions you mention, but presumably it is a zinc base die casting. The following formula should give the desired results:

CLEANING AND COPPER PLATING

Water	1 gallon
Tri sodium phosphate	3 ozs.
Caustic soda	½ oz.
Sodium cyanide 96-98%	1½ ozs.
Copper cyanide	1 oz.
Hyposulphite of soda	1-64 oz.

Temperature 160° F., 4 to 5 volts

Use the steel tank as the anode factor with or without some small copper anodes.

A cyanide copper solution (sweet copper) is made as follows:

Water	1 gallon
Sodium cyanide	3 ozs.
Copper cyanide	2 ozs.
Bisulphite of soda	1 oz.
Caustic potash	½ oz.
Hyposulphite of soda	1-64 oz.

Temperature 100 to 110 Fah. 3 to 4 volts copper anodes.

An acid copper solution (sour copper) is made as follows:

Water	1 gallon
Copper sulphate	28 ozs.
Sulphuric acid	4 ozs.
Yellow dextrine	⅛ oz.

Use as anodes, soft heavy sheet copper; voltage, 2; temperature, 70-75 deg. Fah.; agitate with air if necessary It is possible that a 16 ounce copper sulphate solution with sulphuric acid and dextrine proportionately will give satisfactory results. This can be decided by a test solution.

—C. H. P., Problem 3,803.

Improving a Copper Solution

Q.—I am sending you a sample of a copper sulphate solution which has not been giving good results. I am plating reflectors 15 inches in circumference, using 10 amperes for each square foot of surface. The plate seems to be kind of blotched. Plenty of copper is deposited but it will not come up to a good bright finish when buffed. I think I have plenty of copper in the solution but I do not know about the acid content. The anodes become coated and remain so even when the tank is idle. I have not used it for a week and the anodes are still coated. I would like to have the solution analyzed and to get proper directions for keeping it in good condition. I recently took charge of this solution and do not know exactly what the other plater put into it.

A.—The solution analyzes as follows:

Metallic copper	7.50 oz.
Sulphuric acid	4.6 oz. fluid

This solution is little high in metal and a little low in acid content. We would suggest that you take 20 gallons of solution from tank and place in crock for future additions to solution. Then fill tank with water and add 220 fluid ounces of sulphuric acid. The solution will then contain 6.5 ozs. metal and 5.5 ozs. sulphuric acid per gallon, which is considered a standard for ordinary work.

A current density of 10 amperes per sq. ft. is considered proper and the addition of sulphuric acid will cause the anodes to work clean.

—O. J. S. Problem 3,804.

Data on Chromium Plating

Q.—I am going into chromium plating and would like to know what types of tanks are in commercial use. Is it earthenware, steel, lead-lined steel, etc.? Also, can you tell me what method of heating the solution is best to use? In general, how long is the plating operation, especially on such work as plumbing fixtures?

A.—To produce chromium plated work successfully on a commercial scale requires a careful study of chromium plating. The three main factors are: temperature, current density, and control of the sulphate content of the bath. The following formula is recommended:

Chromic acid	55 ozs.
Sulphuric acid	3 c. c.
Water	1 gallon

Temperature, 105° F.; 75 amperes per sq. ft. The sulphate content of the bath, determined as sulphuric acid, should be 1 part to 100 parts of chromic acid. Steel tanks are preferable to slate lined. Tanks are heated by an iron coil. Use lead anodes.

Plumbing fixtures and all non-ferrous metals should be nickel plated before chromium plating. Steel work should be copper plated, nickel plated and then chromium plated.

Write to the Bureau of Standards, Washington, D. C., for a copy of Technologic Paper No. 346, which contains valuable information on chromium plating.

—O. J. S. Problem 3,805.

Mat Finish for Watch Dials

Q.—Can you tell me how to get the fine pure mat white finish, similar to that used on fine watch dials? I have a lot of work with enameled letters, so that I can not use a sand blast to get the mat effect; also, the pure white we get from the silver has a slight yellow cast as soon as lacquered.

A.—Perhaps you could use a very light sand blast to produce the mat or satin finish on the article. If the enamel letters were protected by a stencil made of soft rubber, which would entirely conceal them and protect them from the sand blast, it might be possibly to sand blast the exposed parts. Either very finely powdered glass or air floated silica should be used as the blasting agent.

If such a method is impractical, acid dips will have to be resorted to. Either of the following solutions will give good results:

Water	1 gallon
Sodium bichromate	4 ozs.
Sulphuric acid, 60°	¾ oz.

Let the articles remain in the dip for a short time and remove when sufficiently matted. The other dip that can be used is:

Nitric acid, 38°	1 gallon
Oxide of zinc	16 ozs.

Mix the oxide of zinc into the nitric acid. Do it slowly or it will boil over. When prepared, heat to 140° to 160° F. by surrounding the stoneware container with hot water. Immerse the articles in the dip until they become matted. They will assume a dark appearance. Remove and wash in cold and hot waters, then immerse in a regular bright acid dip to bring up the mat and lustre finish. If the mat is too coarse in texture, add small amounts of sulphuric acid to the finishing dip until the finish is satisfactory. Be very careful, however, not to add too much sulphuric acid or the mat will be too fine.

To overcome the yellow tone on the silver dials after lacquering, get in touch with the lacquer makers you deal with. If the silver deposit is sufficiently white when it comes from the solution, it should not turn yellow. Many firms produce the silver finish by silver dipping, first cold then hot, which gives them the bright white mat lustre.

Electrodeposits of tin are also being used extensively, especially on clocks. Tin is bluish white and when lacquered gives a very

white finish. If you send us some samples of your article we will electroplate them with tin so you can examine the results.

—C. H. P., Problem 3,806.

Iron in Solution Water

Q.—I am sending a sample of nickel solution which I would like to have analyzed for metal, acid, pH, iron and chloride content; also I am sending sample of water which is taken from the heating system.

In your opinion, would this water be suitable for making a solution? I would also like to have your opinion as to what effect rust in the rinse water used before nickel plating would have on nickel plate?

A.—Analysis of nickel solution:

Nickel	2.68 oz.
Chloride, as ammonium chloride	2.13 oz.
Acid	0.5 cc.
pH	5.1

The solution is too acid. Add 2 cc. per gallon or 6.5 ozs. of ammonium hydroxide for every 100 gallons of solution.

Qualitative analysis of sample of water showed this to contain calcium chloride and ferric oxide. The small amount of calcium chloride would not make the water objectionable for use in preparing the solution; neither would the ferric chloride. The ferric chloride probably is introduced from the water being in contact with iron in the heating system. This could be filtered from the water before use as it will cause a rough deposit if a heavy deposit is desired. The rust in the rinse water, if introduced into the solution, would have the same effect.

—O. J. S., Problem 3,807.

Lacquer to Withstand Heat

Q.—Can you give me a line on a lacquer that will withstand the action of moisture produced in operating a coffee urn? Also, a lacquer that will withstand high temperatures when applied to electric heating apparatus?

A.—Lacquers that will withstand the tests you refer to—extreme temperatures and dampness—have not been produced as far as we know. Cellulose base lacquers will not accomplish the purpose. As far as we know, it will be necessary to go back to the old French copal varnish spirit lacquers with fusel oil only as reducing agent. Such lacquers will accomplish your purpose if applied to metal surfaces and thoroughly aged. Quite frequently a second coat of thin spar varnish was applied to the copal varnish lacquer. This gave maximum resistance to atmospheric conditions and heat.

—C. H. P., Problem 3,808.

Plating Fruit and Leaves

Q.—I am a foreman plater in a large electrical apparatus plant in England. Twenty-seven years ago I left Ansonia, Conn., to go to England, and I am well known in platers' circles in London, Birmingham and other cities in England. I have been doing considerable experimental work in the plating of fruits, leaves and other non-conductors, and I now have a process for direct plating on such materials. I recently deposited 1/32 in. of copper on apples, pears, oranges, etc., and have also chromium plated these fruits. Do you think that such a process would be of any value in the United States? I would be glad to send samples of the work if you care to see them.

A.—Your letter is very interesting. However, you must understand that great and important advances have been made in the electroplating art in this country since you left it. The progress has been greater than in any other part of the world, and if you have not visited this country in so many years and have not kept in close touch with the work done, there is much that you may not be aware of.

The metallizing of non-metallic surfaces has reached a very high state of development. If you have developed any method superior to those now in use here, the American industry would most certainly like to hear about it, and no doubt manufacturers would be very willing to reimburse you for the work you have done.

As far as chromium plating is concerned, America stands foremost in its development. No European country has made as much progress as has been made here. The writer recently toured the leading European countries, including England, and saw no evidence that might lead him to believe that chromium plating has been developed there to anything like the work done here in the past five years.

We would advise that you carefully check up on what has been done in the lines you mention before doing any more work. Then, if you think you have made advances, you can take steps to commercialize your methods if you want to do so.

—C. H. P., Problem 3,809.

Thick Gold Plate

Q.—We have been experimenting for some time trying to gold electroplate to a thickness of .004 to .006 of an inch. We have consulted several authorities, including a formula from THE METAL INDUSTRY, without commercial success and have been informed by one source that it couldn't be done. We feel that it should not be impossible. In fact, during one or two of our experiments we succeeded in doing it but cannot duplicate our success. If this is not a matter of common knowledge and requires research, would you be willing to advise us as to the best people to consult in the matter?

A.—You should have no trouble in depositing gold to a thickness of .004 to .006 inches under proper operating conditions. Theoretically, 6.2 ampere hours are required to deposit .001 inch of gold, but in practice it will be found to take longer. We would suggest that you use the following solution:

Gold as fulminate	1 oz.
Sodium cyanide	2 ozs.
Water	1 gallon

Use at room temperature, with 1 volt pressure, anode and cathode surface equal. If a dull finish is required, use a scratch brush operation at intervals of 1 or 2 hours. If a bright finish is desired, an excess in thickness should be deposited to allow for buffing operations.

—O. J. S., Problem 3,810.

Plating and Pickling Gold

Q.—Please tell me the process for stripping plate from gold and gold alloys, without use of electric current.

What is a good method for gold plating over gold and gold alloys?

A.—The following solution is widely used for stripping and pickling karat gold alloys. It requires no electric current, but many firms find it necessary to use an electro-strip to get the very best results in this work. We give both types of solution. For use without current:

Water	1 gallon
Sulphuric acid, 60°	10 to 16 ozs.
Sodium bichromate	1 to 2 ozs.

Prepare the above solution with cold water first, then heat it to a temperature of 140 to 160° Fahrenheit.

An electro-strip for gold alloys is made as follows:

Water	1 gallon
Sodium cyanide, 96-98%	5 ozs.
Yellow prussiate of potash or soda	4 ozs.

Cathodes, carbon or lead.
Temperature, normal to 120° F.
Voltage, 4 to 6.

In working, the articles should be used as the anodes, and should be moved to and fro while stripping, to produce even results.

For gold plating over solid gold the following formula will give excellent results:

Water	1 gallon
Sodium cyanide, 96-98%	1 oz.
Sodium gold cyanide, 46% fine gold	½ oz.
Caustic potash	¼ oz.

Voltage, 2½ to 3.
Anodes, fine gold; hard rolled sheet nickel or graphitic carbon.
Temperature, 140° Fahrenheit.

If a deeper orange yellow plate is desired, add 1 oz. sodium phosphate per gallon.

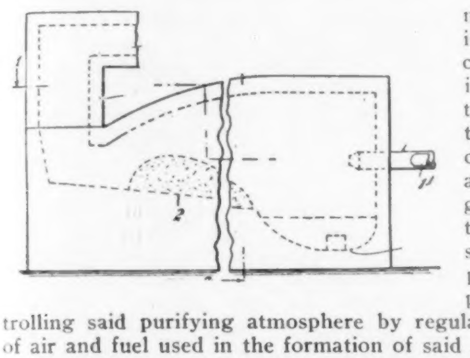
Prepare the solution in the order given. Use one quart of water heated to 160° F. first; add the sodium cyanide, then the gold cyanide, then the balance of the water cold. Finally, add the caustic potash and, if found desirable, phosphate of soda.—

—C. H. P., Problem 3,811.

Patents

A REVIEW OF CURRENT PATENTS OF INTEREST

1,687,277. October 9, 1928. **Method and Apparatus for Purifying Metals.** Harry H. Alexander, Westfield, N. J.



The method of melting and refining copper which comprises impinging hot combustion gases against the surface of a charge of copper and thereby progressively melting the copper while subjected to a purifying atmosphere, and controlling said purifying atmosphere by regulating the amount of air and fuel used in the formation of said combustion gases in accordance with the nature and composition of the impurities present in the charge, said regulation being effected in accordance with periodic determinations of the character and amount of impurities present in the molten copper.

1,687,924. October 16, 1928. **Bearing Alloy.** Christopher H. Bierbaum, Buffalo, N. Y., assignor to Lumen Bearing Company, Buffalo, N. Y.

A bearing consisting of an alloy containing 84.5 per cent copper, 10.5 per cent of tin, and 5 per cent of nickel; said alloy being cast in the absence of zinc against a chill so that the alpha crystal is not hardened but left soft and a large amount of hard delta crystal is formed upon the chilled surfaces, and a wide range of hardness being present between the hardest delta crystal and the softest alpha crystal.

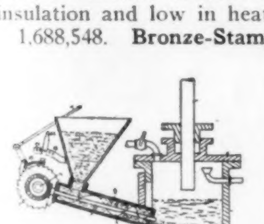
1,688,043. October 16, 1928. **Alloy.** John A. Gann, Midland, Mich., assignor to The Dow Chemical Company, Midland, Mich.

As a new product, an alloy containing approximately ninety per cent of magnesium, nine per cent of aluminum, and less than one and one-half per cent of copper.

1,688,220. October 16, 1928. **Furnace Lining and Method of Making Same.** James R. Wyatt, Camden, N. J., assignor to The Ajax Metal Company, Philadelphia, Pa.

In an induction electric melting furnace, a furnace casing, rammed heat insulation therein and an inner lining adapted to hold the molten content of the furnace, resting upon the heat insulation and low in heat insulating quality.

1,688,548. **Bronze-Stamping Mill,** October 23, 1928. Alfred Lebrecht, Nuremberg, Germany, assignor to L. Auerbach & Co., Furth, Germany. A method of working for bronze stamping mills and the like with uninterrupted charging and discharging of the stamper pot, comprising pushing the raw material into the stamper pot at the bottom, underneath the material already present therein.



1,689,630. October 30, 1928. **Heat Treating Magnesium Alloys.** Zay Jeffries and Robert S. Archer, Cleveland, Ohio, assignors to American Magnesium Corporation, Niagara Falls, N. Y. The process of working magnesium base alloys, comprising subjecting the solid metal to heat treatment at a high temperature for a period of hours but below the melting temperature of the most fusible constituent of the alloy to increase the plasticity of the alloy and thereafter mechanically deforming the alloy.

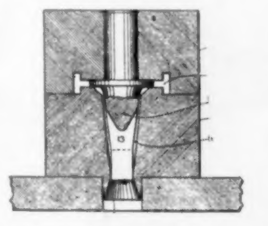
1,690,534. November 6, 1928. **Self-Fluxing Solder and Method of Making Same.** John Peabody Erich, Chicago, Ill., assignor to Chicago Solder Company, Chicago, Ill.

The method of preparing a flux cored solder tube, which consists in sealing said tube by compressing the walls of a section of the tube into metal-to-metal contact, and grooving such compressed section to deflect the longitudinal line of the flux core and the line of contact of said compressed walls.

1,691,207. November 13, 1928. **Process of Refining Metals and Alloys.** Aladar Pacz, East Cleveland, Ohio.

The process of refining a metallic composition containing silver characterized by stirring an alkali fluoride therein while in the molten condition.

1,691,220. November 13, 1928. **Die-Casting Mold.** Harry A. Adams, Rochester, N. Y., assignor to North East Electric Company, Rochester, N. Y.



A die-casting mold, of the type comprising a die provided with a gate and a die provided with a core extending into said gate and forming, therewith, a narrow annular passage for molten metal, characterized by the fact that the extremity of the core fits closely within the extremity of the gate, and the core has a longitudinally extending slot forming a passage into the gate beyond the point at which the parts are so fitted.

1,691,532. November 13, 1928. **Solder for Aluminum.** Oskar Spengler, Dessau in Anhalt, Germany, assignor to I. G. Farbenindustrie Aktiengesellschaft, Frankfort, Germany..

As a solder for aluminum, an alloy comprising about 85-95% aluminum and about 5-15% of silicon.

1,691,931. November 20, 1928. **Bearing-Metal Alloy.** Karl Müller and Wilhelm Sander, Essen, Germany.

A bearing metal alloy comprising about 70 to 75 per cent of lead, about 15 to 25 per cent of antimony, about 3 to 6 per cent of tin, about 1 to 3 per cent of a metal of the cobalt type, and about 0.6 to 2 per cent of copper.

1,691,932. November 20, 1928. **Bearing-Metal Alloy.** Karl Müller and Wilhelm Sander, Essen, Germany.

A bearing metal alloy comprising approximately from 70 to 75 per cent of lead, 15 to 25 per cent of antimony, 3 to 6 per cent of tin, and appreciable quantities of cadmium not exceeding 5 per cent.

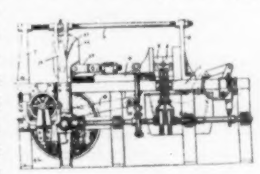
1,692,240. November 20, 1928. **Cadmium-Plating Bath.** Arthur White Young and Maurice Emerson Louth, Kokomo, Ind., assignors to Udylite Process Company, Kokomo, Ind.

In the art of cadmium plating, the process which comprises electroplating cadmium from a cyanid bath in the presence of an addition agent comprising a cereal extract and caramelized sugar.

1,692,936. November 27, 1928. **Copper Alloy.** Friedrich Heusler, Dillenburg, Germany.

The method of increasing the hardness and elastic limit of alloys containing a predominant proportion of copper, 0.5 to 20% of manganese, 0.3 to 8% of silicon, which consists in first annealing the alloys after they have been cast, rolled or forged at a temperature above 450° C., then cooling and finally hardening the same at a temperature of from 200 to 350° C.

1,690,081. October 30, 1928. **Die-Casting Machine.** Charles J. Sykes, Chicago, Ill., assignor to Lewis J. Brainard, Chicago.



In a machine of the character described, a die having a movable member, a reciprocatory device movable transversely with respect to the path of said member, an element connected to said member and having a slot inclined with respect to the path of said reciprocatory member, and an actuator carried by said device and extending into said slot.

1,693,640. December 4, 1928. **Process For Treating Impure Lead.** George E. Dalbey, East Berlin, Conn.

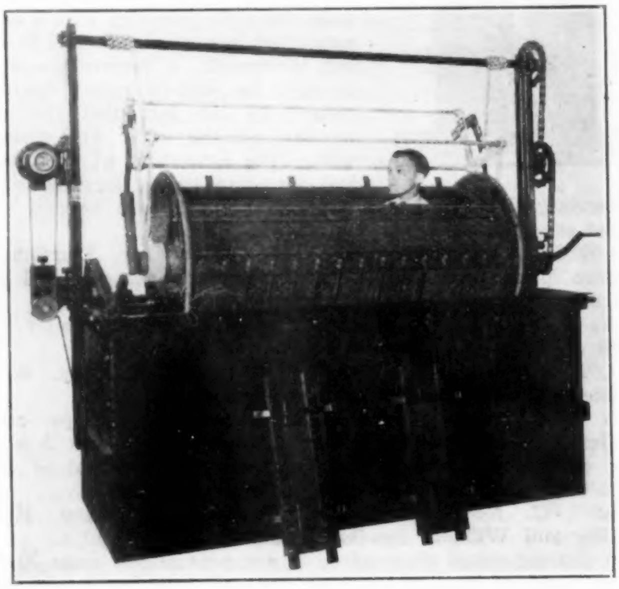
The process of treating impure lead for the removal of arsenic, tin, antimony and the like, which comprises bringing the metal in a molten condition under the influence of litharge and at the same time making gradual additions of a water solution of a caustic alkali and maintaining the whole at a temperature which will always allow the reacting materials on the surface of the molten metal to remain in a powdery or granular condition.

Equipment

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

New Large-Type Plating Barrel

The accompanying illustration shows a new barrel plating machine that was recently developed by Lasalco, Inc., St. Louis, Mo., well-known manufacturers of mechanical electroplating apparatus, buffs, compounds, generators, etc. The barrel shown is the largest the company has ever produced, measuring on the inside of the tank 7 by 3 by 3 feet, and having a capacity of 400 gallons of solution 30 in. deep. The picture shows a 17-year-old boy seated comfortably in the plating cylinder. This cylinder is of all formica construction, and will plate from 700 to 800 pounds of work at one load. It measures 24 in. in diameter and is 60 in. long.



LARGE-TYPE PLATING BARREL

In regard to this barrel, the makers state that extra large apparatus of this type have hitherto failed because they would not plate a large amount of work as rapidly as the smaller tanks would plate smaller amounts. As the size of the barrel capacity was increased, the length of plating time also tended to increase. However, the new large barrel now being produced is said to operate as rapidly as the smaller barrels of the same type, which have been found to be very rapid and efficient. Another interesting development of this concern is a pigmy plating barrel, which will be the smallest on the market.

New Nickel Coloring Compound

George A. Stutz Manufacturing Company, 1641 Carroll Avenue, Chicago, Ill., manufacturers of electrochemical and metal finishing equipment, buffing compounds, etc., have developed a new coloring substance which is designed particularly for putting a white finish on nickel plate which is applied previous to chromium plating. The makers state that when this compound was first developed, tests were made by chromium plating directly after coloring, without any intermediate cleansing of the buffed nickel surface. These tests, the company claims, proved very successful, the cromium proving fully adherent and no defect being caused by omitting the cleaning operation previous to placing in chromium bath. However, the Stutz company states that it does not sell this Special Chrome White compound with the intention of having the plater use it on nickel so that this cleaning operation will be eliminated. They state that cleanliness being of such importance in quality plating, it is advisable to perform the cleaning operation after the compound has been applied. However, after buffing with this compound, they state, the articles are very easily made perfectly clean and safe for chromium plating.

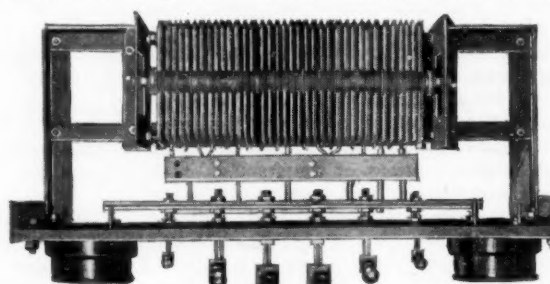
Cast Grid Tank Rheostats

A new type of rheostat for use with electroplating tanks has been introduced by the Columbia Electric Manufacturing Company, 1292 East 53rd Street, Cleveland, Ohio. In describing their new product, the company states that the control of current through a plating solution is dependent in general upon the voltage on the tank and the current in the solution. Since generator voltage is fixed, usually at six volts, nine volts or twelve volts and as the amount of current in any given solution depends upon the amount of anode and cathode surface exposed, it is important to have absolute control of the current and voltage in the solution, which control is effected by means of a tank rheostat.

Throughout industry the cast-grid resistor is used to control the current of slip-ring type motors, direct current crane motors and direct current adjustable speed motors. The efficiency of this type resistor has been proven and it is almost the only type resistor sturdy enough to withstand constant abuse. The cast-grid resistor reduces heating to a minimum, eliminates all high resistance joints, breakage, and loose connections at point of contact, the company claims.

Columbia cast-grid rheostats are of the parallel resistance type. These rheostats afford regulation of voltage and of current according to the generator voltage and character of plating. They are ruggedly built to withstand plating fumes and acids. The operating panel is of heavy asbestos board. The knife switches are all of substantial size to withstand much more than the amount of current allotted to them. The entire unit is built to withstand an overload.

The panel is mounted on an angle frame work. In the rear of the panel are the cast-grid resistors which are mounted securely and bolted together in sections. All grids are classified in sections and are controlled by the switches on the front of the board. The contact surfaces carrying the current are grid bosses which are ground parallel and smooth. Each switch controls one section of resistance which may be introduced into the circuit as required.



VIEW FROM TOP. GRIDS ARE PLACED ON ANGLE FRAME

The rheostats are manufactured with switches suitable to give steps of about two and one-half per cent of full ampere capacity. If closer regulation is required, rheostats can be built to give one per cent full ampere capacity regulation. For flash plating a short-circuiting switch may be provided. This switch would short-circuit the entire resistor and apply the full generator voltage to the work.

Polishing Composition for Chromium

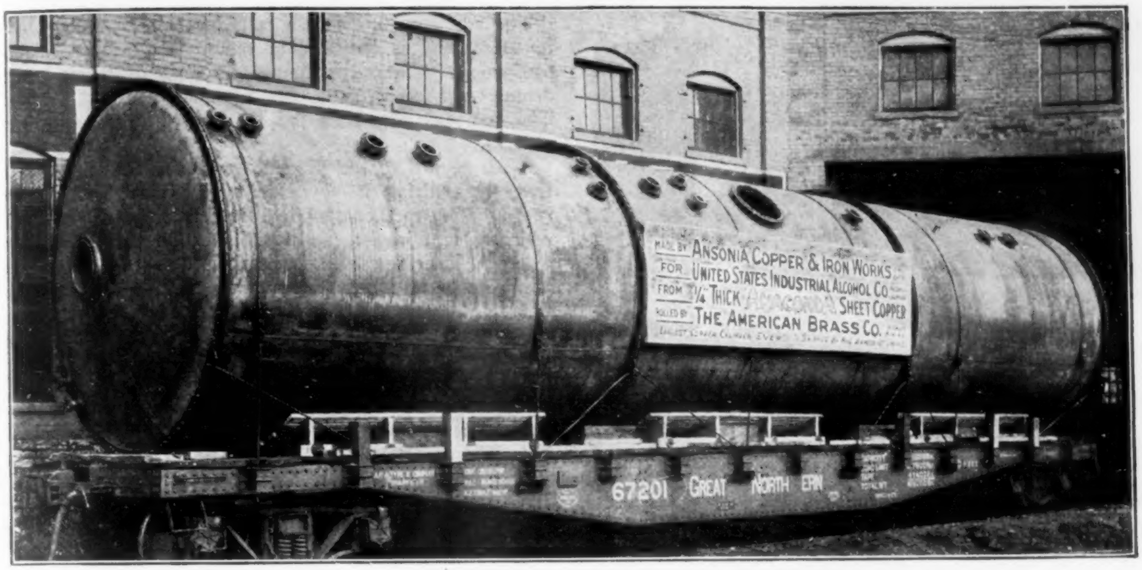
The Nulite Polish Company, Inc., 240-242 Plymouth Street, Brooklyn, N. Y., manufacturers of a wide variety of cutting and polishing compounds for metal finishers, etc., have recently placed on the market the following two grades of White Chromium Composition: Grade A, which is intended for use as a chromium finisher, to bring out a high color and lustre; Grade B, for use where a heavier cut is desired, especially in those cases where clouding or frosting have taken place during the chromium plating process. The makers state that in several exhaustive tests the compositions were found very satisfactory.

Huge Copper Still Brazed with Silver Solder

The problem of welding the seams of copper industrial alcohol stills with a material that would withstand the attacks of butyl acetate or other corrosive agents was recently solved with silver solder by the Ansonia Copper and Iron Works at Cincinnati, Ohio.

The cylinder illustrated is believed by its makers to be the largest copper tank ever constructed in America. It was built for the United States Industrial Alcohol Company, of Peoria, Illinois. Nine 133 x 195¼ inches rolled sheets of ¼ inch Anaconda copper weighing 18,300 pounds and two 133 inches quarter-inch rolled copper circles weighing 2,700 pounds were used in its construction. The completed cylinder with its coils weighed 14 tons.

There is not a rivet in it. All seams are brazed with silver solder, by means of oxy-acetylene torches. After completion, the tank was tested under 5 pounds hydrostatic pressure, and the coils at 200 pounds. No leaks developed. Sample sections of seams on body were sent to Johns Hopkins University, where they withstood pulling tests equivalent to 29,000 pounds per square inch. Failure was shown in the body of the metal back of the seam, not in the seam. In other words, the silver-welded joints were stronger than the metal they joined.



IMMENSE COPPER STILL BRAZED WITH SILVER SOLDER THROUGHOUT

However, as already indicated, silver solder was used because of its resistance to corrosion, in addition to its strength. It took the place of tobin bronze formerly employed by this company on alcohol still work, because this bronze was attacked by the acids used in the distillation process. The silver solder was furnished by Handy and Harman, New York City.

Sand Blasts and Dust Arresters

The year 1929 will witness the rounding out of a quarter of a century of activity of The Pangborn Corporation, Hagerstown, Md., manufacturers of sand blasting and dust arresting equipment for the foundry and other industries. The foundry industry during the past twenty-five years has seen probably no more marked advance in any direction than in that of cleaning by improved methods, and in this movement the Pangborn company has taken a considerable part.

At the time The Pangborn Corporation was founded by Thomas W. Pangborn, its president, and John C. Pangborn, vice-president, the use of the sand blast was by no means general. Most foundries shunned it and the few who tried to use it were hampered by the dust and other difficulties that attended its operation. Usually it was done in an open yard, without any means of protection, and not only the user but the general neighborhood was annoyed and menaced. This condition was soon remedied by the development of equipment by the Pangborn organization, means soon being devised to enclose the operation and make it quite safe and efficient.

This phase of sand blasting as well as improvement of the equipment itself had the early attention of the Pangborn Organization and with the advent of hygienic equipment and the use of steel abrasive pioneered by Pangborn, there is no sand blasting operation today that cannot be installed in any part of the plant, to coordinate with other operations, under entirely hygienic conditions.

With present Pangborn sand blast equipment and cloth screen dust arresters the cleaned air is generally returned to the working atmosphere with a considerable saving in fuel in cold weather and with the approval of the State Labor Boards, the company states.

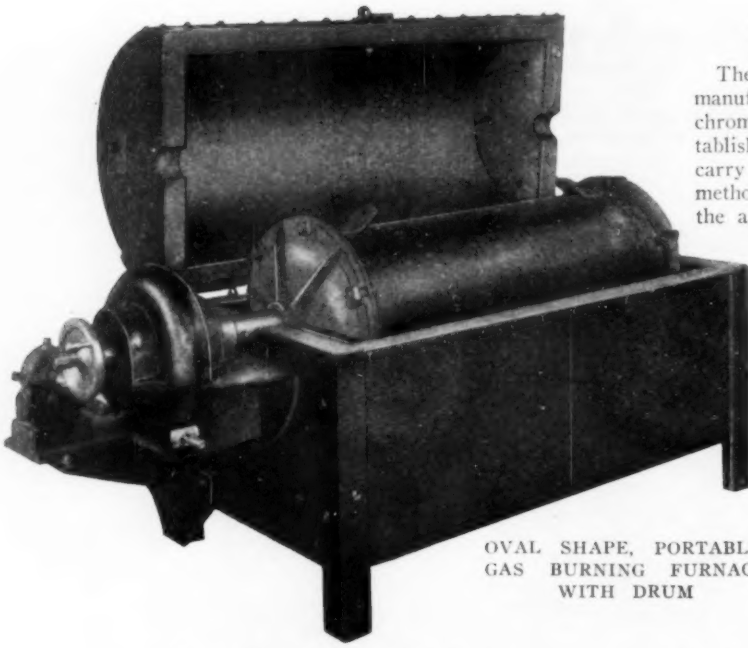
With the founding of The Pangborn Corporation the universal equipment used was the hose sand blast machine, with the hose and nozzle manipulated by the operator for practically any and every size and character of casting. During the past quarter century hygienic and automatic equipment has been developed and produced for almost every class of sand blast cleaning. A recent development is an automatic rotary table, 12 and 18 feet in diameter, weighing upwards of 20 tons, which handles pieces as large as bath tubs, sinks, as well as light, thin-section stove and range parts and the like, preparatory to enameling.

In contrast to this is a small sand blast barrel that sets on the ordinary work bench for cleaning pieces such as small dental drills hardly larger than pins. Between these two, equipment consisting of sand blast rooms, cabinets, barrels, tables, etc., in different sizes and types of application, cover every requirement of metal working industries.

Protection for the sand blast operator working within a room has also advanced, the latest development being a new moulded rubber helmet which is ventilated by water-washed, atmospheric air.

Recognition of the efficiency and economy of Pangborn equipment has extended beyond the limits of our own country, and both sand blast and dust collecting equipment are now installed in South America as well as in the old world, in the British Isles, France, Italy and Australia, etc., the company states.

The Pangborn plant occupies a site of twenty-five acres at Hagerstown, Md., with railroad siding facilities, served by four railroad systems. Water route loading at Baltimore, three hours distant, provides for quick Atlantic and Pacific coast shipment by water. The growth of the business has been continuous and arrangements for substantial plant extensions are now under way.



OVAL SHAPE, PORTABLE, GAS BURNING FURNACE WITH DRUM

New Buff Wheel Plant

The Allied Industrial Products Company, Chicago, Ill., manufacturers of buff wheels, polishing compounds and a variety of other polishing, cleaning and abrasive materials, have moved into their new plant, shown in the illustration. The new quarters permit considerably increased production, as the company now has more space as well as new and improved machinery and other equipment.

NEW ALLIED INDUSTRIAL PLANT

The company's chief output is bleached and unbleached sewed piece buffs, canvas, bull-neck, sheepskin and walrus wheels, used for polishing metals. The company states that by the use of a cement which was especially developed for the purpose, it has succeeded in eliminating splitting of polishing wheels, which makes for increased life of the equipment. It is also claimed that uniformity is insured by the purchase of sheeting direct from cotton mills.

Other products of this company include platers' lump pumice stone, metal cleaners of all kinds, oil removers, metal rouges, steel wool, tripoli compound, etc.

Chromium Polishing Compositions

The Krigner Tripoli Company, 425 South Campbell Avenue, Detroit, Mich., has recently made a large increase in its plant capacity and is now in a position to supply its well-known brands of polishing compositions to all users, according to a statement issued by the company.

The Krigner company has a number of special compositions for specific uses which are manufactured by a new process, it is stated. These include No. 375 Tripoli, used for cutting down before chrome plating, No. 575, for coloring brass and copper before nickel plating, and No. 775 Lime Finish for coloring nickel before chrome plating. It is stated that these are fully saponifiable, easily cleansed and highly useful in preparing articles for chromium plating. The company furthermore states that an engineering department is maintained for working out polishing problems, surveying the needs of polishing departments and recommending methods.

Sherardizing and Plating Equipment

The New Haven Sherardizing Company, Hartford, Conn., manufacture and market equipment and materials for sherardizing, chromium plating and udylite processing. The company was established in 1910, to manufacture sherardizing equipment and to carry on a sherardizing business. Sherardizing is a widely known method of rust-proofing iron, steel and other metallic surfaces by the application of zinc.

The company has shown considerable expansion since its start, and is the leading factor in the sherardizing equipment business, producing furnaces of many types, drums, and other apparatus necessary for this work. The company also sells the zinc dust necessary for the process.

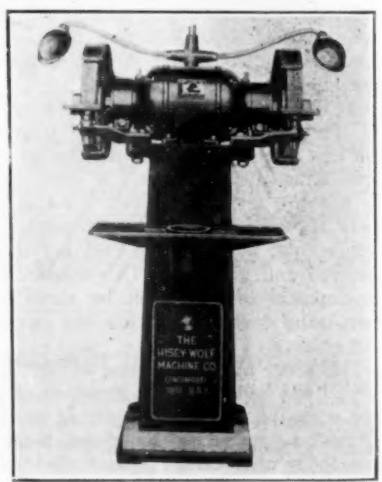
With regard to the process itself, the company states that sherardizing is now one of the most widely used rust-proofing methods applied. It makes a surface highly resistant to abrasion, so that it can be put on articles where a wearing finish is needed. One of its features is said to be its ability to penetrate hollows and recesses, making it very good for coating tubes inside and outside, for all surfaces of foundry flasks and other apparatus where rust prevention is desired.

Roughly outlined, the process consists of placing articles in a rotating drum together with a quantity of zinc dust. The drum is then placed in a furnace which is heated first to about 700° F., and then left to cool down to a somewhat lower heat. Drums are kept rotating throughout the process, which requires some hours. The drums are later removed from the furnace and cooled slowly. A large quantity of work is usually done at one time.

Attachments for Buffing Machines

Two new devices have been designed for use with grinding and buffing machinery made by The Hisey-Wolf Machine Company of Cincinnati, Ohio, manufacturers of portable and other electric machine tools. The improvements just announced are a new type of foot treadle switch which is said to be absolutely "forget-proof" and automatic grinder or buffer lights, which burn only while the machine is in operation, turning on and off with the motor control switch.

Both of these devices are said to have the advantages of saving current and also the time of the operator when work requires a great deal of starting and stopping of machinery. The lights, in addition, have the advantage of plainly showing when a machine is on or off, ball bearing grinders and buffers having a tendency to rotate for some time after current has been turned off. These lights, shown in the illustration, where the treadle is also pictured, have flexible metal holders, which permit easy adjustment at any desired angle. The company states that any Hisey grinder or buffer with push button or foot-treadle switch can be supplied with the new type of lights.



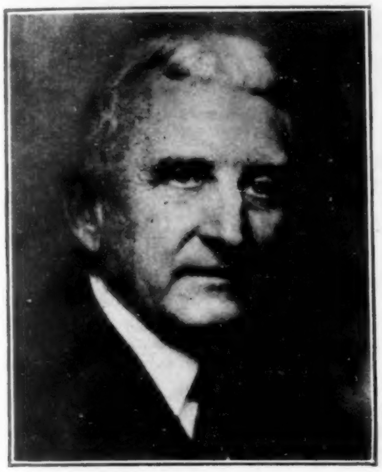
GRINDER WITH NEW TYPE LIGHTS AND TREADLE

The new type of treadle is described as extending the entire width of the machine's column, allowing simultaneous operation by two workmen without interference with each other. The switch retains all the safety and automatic features of push button control, it is stated, besides affording many added conveniences.

The company has prepared literature regarding these new developments, which can be supplied on request of parties interested in them.

New Chase Mill in Cleveland

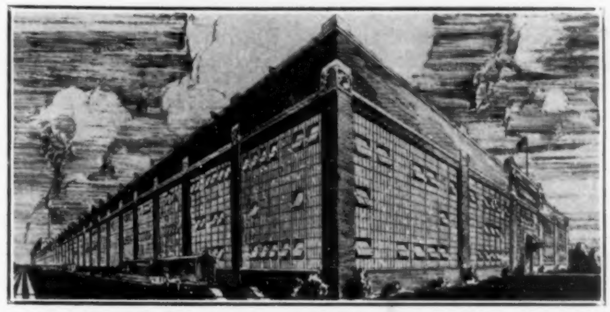
In a recent issue of "The Clevelander" is an article by F. S. Chase, president of the Chase Brass and Copper Company, pointing out their reasons for choosing Cleveland as the location of their new mill. The Chase company was familiar with the Middle West, of course, through its many warehouses. They chose Cleveland because of its diversification of industry, its accessibility to a wide field of large industries and the coöperative spirit of the Chamber of Commerce and public officials.



F. S. CHASE

The Waterbury plants of the Chase company have been running to capacity and had to be increased. It was decided that this increase should be in the immediate neighborhood of a large volume of the Chase business, so that local service could be given to these customers which could not be given from Waterbury.

This move of the Chase Companies was discussed in our editorial pages of our December issue. It marks the first westward move of any New England mill since the expansion program of the American Brass Company.



CLEVELAND PLANT, CHASE BRASS AND COPPER COMPANY

Use of Electric Furnaces

On page 491, issue of November, 1928, there appeared an equipment article on electric furnaces made by the Ajax Electrothermic Corporation. Due to a misunderstanding, the graph illustrating this was taken to show sales year by year from 1917 to the end of July, 1928, and the explanation stated that as the graph showed sales of some 8,000 kilowatts in the first seven months of 1928, the full year's sales would probably exceed 15,000 kilowatts. This was erroneous. The figure on the graph indicated that 8,000 kilowatts had been sold in the full 10½ years. The gain, therefore, while steady, has not been as large as indicated.

Equipment and Supply Catalogs

Laclede-Christy, St. Louis, Mo. December bulletin.

A Standard Bearing Metal. A. Allan and Son, Harrison, N. J.

Rockwell Hardness Tester. Wilson-Maeulen Company, New York City.

Type HEA-3 Polyphase Ammeter. Roller-Smith Company, New York City.

An Independent Business Journalism. The Associated Business Papers, Inc., New York City.

Cutler-Hammer Manufacturing Company, Milwaukee, Wis. Circular on motor control problems.

Durabilt Steel Locker Company, Aurora, Ill. Folder No. 6000A on steel lockers, cabinets, etc.

Universal Steel Shelving. Universal Fixture Corporation, 135 West 23rd Street, New York City.

How High Should Labor Turnover Be? Metropolitan Life Insurance Company, New York City.

Acid Globe Valve. Walworth Company, Boston, Mass. Valves for use with chemical piping systems.

Oil Firing. The Brown Instrument Company, Philadelphia, Pa. Circular on temperature control apparatus.

Automatic Wire and Ribbon Metal Forming Equipment. The Baird Machine Company, Bridgeport, Conn.

Public Safety. National Safety Council, Chicago, Ill. December, 1928, issue of a monthly publication on safety.

Drying Chemical and Mineral Substances. Ruggles-Coles Engineering Company of Hardinge Company, Inc., York, Pa. A circular.

The Mond Nickel Bulletin. The American Mond Nickel Company, Pittsburgh, Pa. Summary of current information on nickel.

Engineering Achievements—1928. Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa. Illustrated 24-page booklet.

Oscillator or Spark-Gap Type Converters and Furnaces. Ajax Electrothermic Corporation, Trenton, N. J. Bulletin No. 4, illustrated.

From the Constitution to the Virginia. Taunton-New Bedford Copper Company, Taunton, Mass. Circular on copper and brass for marine use.

Third International Foundrymen's Congress, London, 1929. American Foundrymen's Association, Chicago, Ill. Illustrated booklet describing pre- and post-convention tours.

Oval Tube Air Heaters. Shaw-Perkins Manufacturing Company, Pittsburgh, Pa. Equipment for preheating combustion air, industrial heating, drying and other purposes.

Obsolete and Inactive Patterns. Metropolitan Life Insurance Company, New York City. Interesting 20-page booklet on a subject important to foundries and machine shops.

Segment Chuck. Samuel C. Rogers and Company, Buffalo, N. Y. Circulars illustrating a new segment wheel chuck adaptable for use on vertical and universal machine grinders, various machine knife grinders, etc.

Reducing the Cost of Electric Power. Electric Machinery Manufacturing Company, Minneapolis, Minn. A well illustrated, 48-page book on power factor correction with static condensers; non-technical exposition of certain means of reducing electric power costs.

Machinery, Tools and Work Benches. Leiman Brothers, 23 Walker Street, New York City. Dust collecting, pumping, rolling, metal working equipment; plating dynamos; sand blasts; other equipment. A fully illustrated catalog, of interest to all metal workers, platers, finishers, etc.

Pictures from Bell Telephone Laboratories, Inc., New York City. A 72-page book of half-tone reproductions of photographs taken in connection with the research work of the laboratories. Fine illustrations giving an outline of the work and achievements of one of the most important research organizations in the world.

General Electric Company, Schenectady, N. Y. Publications: Automatic Arc Welder for Steel Railroad Ties; Atomic-Hydrogen Arc Welding Equipment; Reciprocating Air Compressors; Arc Welder, Belt or Motor Drive, Stationary or Portable, Self-excited, Single-operator; Electric Heating Equipment for Industrial Ovens.

Cadalyte—Its Development, Advantages and Operation. The Grasselli Chemical Company, Cleveland, Ohio. A highly enlightening booklet on this cadmium plating process. Gives details of all phases of its development, considerable technical data on the rust-preventing properties of cadmium, and much valuable information on the electrodeposition of cadmium.

Finishing Research Laboratory Service. Finishing Research Laboratories, Inc., Chicago, Ill. A fine illustrated booklet describing a consulting and testing laboratory service dealing with the application of finishes of all kinds to any type of surface. It covers plan surveys, inspection, testing, instruction, books, sales research and general research services, each being carefully described.

The Season's Greetings

We earnestly thank all those who were so thoughtful as to send THE METAL INDUSTRY their greetings, calendars, souvenirs, etc. They are:

American Brass Company, Waterbury, Conn.
American Exchange Irving Trust Company, New York City.
Dr. Robert J. Anderson, Fairmont, W. Va.
The British Aluminium Company, New York City.
William A. Cowan, National Lead Company, New York City.
Commercial Exchange Bank, New York City.
General Electric Company, Schenectady, N. Y.
A. L. Haasis, Joseph Dixon Crucible Company, Jersey City, N. J.
Hardinge Company, Inc., York, Pa.
National Chromium Corporation, New York City.
New York Edison Company, New York City.
Ernest V. Pannell, 165 Broadway, New York City.
Paxon-Taggart, Inc., Philadelphia, Pa.
Victor Photo-Engrvaing Company, New York City.
West Virginia Pulp and Paper Company, New York City.
E. A. Williams and Son, Inc., Jersey City, N. J.
Wisconsin Trade News Bureau, Milwaukee, Wis.

Associations and Societies

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

American Foundrymen's Association

HEADQUARTERS, 222 WEST ADAMS STREET, CHICAGO, ILL.

ANNUAL CONVENTION PLANS

The general program for the Chicago convention and exhibit of the American Foundrymen's Association, April 8 to 11, 1929, as developed, promises a most interesting and profitable meeting for the foundrymen of America.

All activities of the week, registration, technical sessions, dinners, banquets, and exhibits, will be in the new Hotel Stevens. All technical meetings will be on the third floor, with ample accommodations for simultaneous sessions. Registration headquarters and exhibits will be on the basement level, one flight down from the main lobby. While exhibits will be limited as to space occupied, they will be as interesting as ever in character.

The program as planned will be so full as to provide but little opportunity for general entertainment for the men, but the usual entertainment for ladies will be arranged for. On Monday evening will occur the annual exhibitors' dinner. On Tuesday evening there will be a general session on foundry sands, preceded by a special dinner on the third floor. On Wednesday evening will occur the annual banquet, which is the big social event of the convention. The usual provisions for plant visitation will be made.

We give here a list of the events on the tentative program which are of interest chiefly to the non-ferrous metal trades:

TENTATIVE PROGRAM

	Monday, April 8
10:00 A. M.	Registration.
	Exhibits Open.
2:00 P. M.	Committee Meetings.
	Tuesday, April 9
10:00 A. M.	Foundry Costs.
12:30 P. M.	Round Table—Non-Ferrous Cost Methods.
4:00 P. M.	Sand Control.
6:00 P. M.	Dinner gathering of those interested in sand control.
7:00 P. M.	Foundry Sands.
	Wednesday, April 10
10:00 A. M.	Non-Ferrous Founding.
	Materials Handling.
12:30 P. M.	Round Table—Non-Ferrous Shop Practice.
2:00 P. M.	Foreman Training.
	Thursday, April 11
10:00 A. M.	Apprentice Training.

Round Table Luncheon Meetings. The round table meetings permitting of informal discussion of shop problems have proven a great success in the malleable and non-ferrous branches, and a similar meeting is being arranged for steel foundrymen. At these meetings, members present are privileged to ask for discussion on any topic.

Foreman Training. Foreman training, a subject of increasing importance to foundrymen, will be given a place on the program this year. Several men prominent in foreman training have been secured to tell how training programs can be made worth while. Those who have consented to appear on this program are:

A. B. Pierce, Director, Department of Industrial Education, National Metal Trades Association, Chicago, Ill.

M. H. Mellen, Superintendent of Education, General Electric Company, West Lynn, Mass.

A. D. Lynch, Director of Personnel, Ohio Brass Company, Mansfield, Ohio.

W. F. Coleman, W. A. Jones Foundry and Machine Company, Chicago, Ill.

L. A. Hartley, Director of Education, National Founders' Association, Chicago, Ill.

Apprentice Training. The why and the how of foundry apprentices will be brought out at the session on training foundry apprentices.

J. A. Davies, General Superintendent of the Philadelphia branch of the Westinghouse Electric and Manufacturing Company will explain the why and **A. M. Cornell,** Vice-President of the Pettibone-Mulliken Company, Chicago, will show how training can be carried on. Other speakers will give further details of these two aspects of apprentice training.

Non-Ferrous Foundry Costs. As the gray iron, steel, and malleable cost methods have been given prominence at the past cost sessions of the A. F. A. meetings, the program this year calls for a consideration of ways and means of getting the non-ferrous foundry operators to consider the use of a uniform cost finding method. Following the regular cost session, those interested in non-ferrous costs will get together at a luncheon meeting.

Sand Control. Breaking a precedent of many years' standing, a technical session will be held as an evening meeting. The subject to be discussed is that of sand control. The evening meeting was scheduled in order that all who are interested might attend without conflicting with their attendance at other sessions. Preceding the evening session, a meeting on sand control will be held at 4:00 p.m., which will be for the purpose of explaining the fundamentals of sand control and how sand control may be started in foundries.

Metallurgy and Shop Practice. The usual technical and shop practice sessions will be held covering developments in the iron, steel, malleable and non-ferrous branches of the industry.

PRIZES FOR CONVENTION PAPERS

The Board of Awards announces that the Committee appointed to select the three 1928 (Philadelphia) convention papers, the authors of which are to receive $100.00 cash prizes, have selected the following:

Temperature Measurements of Molten Cast Iron, by H. T. Wensel and W. F. Roeser.

The Effects of Lead on the Properties of a Complex Brass, by O. W. Ellis.

Reducing New Sand Consumption in a Steel Foundry, by H. A. Mason.

The prizes will be presented at the 1929 convention. Similar prizes will be given for three papers presented at the 1929 Convention on any of the following subjects: gray iron, steel, malleable, non-ferrous, sand control, and general practice. One paper in each class will be awarded a prize.

Institute of Metals Division

HEADQUARTERS, 29 WEST 39th STREET, NEW YORK CITY

ACTIVITIES DURING 1928

At the Fall meeting of the Division in Philadelphia, held in conjunction with the American Society for Steel Treating, Division membership was reported as 1,196 out of a total of approximately 8,700 in the American Institute of Mining Engineers.

Our meeting in February in New York City was well attended and the program was unusually good. At the Division dinner the informal talk was given by W. H. Bassett, of the American Brass Company, and his subject was "Copper and its Alloys." At the Fall meeting the informal talk at the Division dinner was given by F. M. Becket, on "Chromium." At both of the meetings the Division dinners stand out as important events. They give an opportunity for members of the Division to meet socially, and whenever possible we have included the ladies.

The plan of meeting in the autumn with the American Society for Steel Treating, during National Metal Week, has worked out very nicely because the intervals between meetings have been more uniform than when we were meeting in the Spring with the American Foundrymen's Association.

At the Philadelphia meeting, particularly at the joint sessions with the American Society for Steel Trading, those in attendance were most representative. Dr. Jeffries commented on this phase of the meeting and thought that we had brought out as representative a group of non-ferrous metallurgists as it was possible to find in any of our national technical society gatherings.

The general form of committee organization which has been in vogue for the past few years, together with the Division dinner program, has been proving very successful.

The Annual Lecturer for the Division was Professor C. H. Mathewson, of Yale University. The 1929 lecture will be delivered by Ulick R. Evans, of Cambridge University, Cambridge, England. Mr. Evans will also act as Honorary Chairman of the Corrosion Symposium to be held at that time.

The cooperation which the Division is getting from the officers of the main Institute is most gratifying, and it is becoming increasingly evident that the Division is a real part of the organization. It certainly is the organization to which non-ferrous metallurgical people should give their time and attention by becoming members.

There will be a meeting of the Institute on February 18, in conjunction with the annual meeting of the Mining and Metallurgical Engineers, at New York.

—W. M. Corse, Secretary.

American Electroplaters' Society

Detroit Branch

HEADQUARTERS, T. C. EICHSTAEDT, 654 MOUNT ELLIOT STREET, DETROIT, MICH.

CONVENTION PLANS

A complete list of the committees that have been formed to make the arrangements for and take care of all details during the coming convention of the American Electroplaters' Society is now ready and is given below. The convention, held annually, will take place July 8 to 11, 1929, at the Hotel Statler, Detroit. There will be an exhibition of products of the plater's art and many plant visits, sight-seeing tours and other features. Detroit has been a convention city before and is certain to make the event one of the finest in the association's history. The following committees will see to that:

Executive Committee—General Chairman, E. G. Lovering, 4552 Commonwealth avenue; General Secretary, C. M. Phillips, 13421 Camden avenue; E. V. Allen, A. T. Wagner, M. Beaubien, H. J. Jameson, W. W. McCord, C. H. Eldridge, H. M. Cherry.

Committee on Papers—Chairman, H. J. Jameson, 1415 23rd street; Secretary, B. Lewis, 10398 American avenue; J. Fritts, J. F. McCullough.

Budget Committee—Chairman, E. V. Allen, 6912 Garfield avenue; Treasurer, C. M. Phillips, 13421 Camden avenue; Geo. Kutzen, Chas. Cunningham, W. White, Chas. Mascola, H. J. Jameson.

Registration Committee—Chairman, C. M. Phillips, B. E. Miller, M. Hayes, M. Beaubien.

Program Committee—Chairman, A. T. Wagner, 230 Tuxedo avenue; H. M. Cherry, C. H. Eldridge, E. V. Allen, H. Carr, F. C. Eichstaedt, W. White, Mr. Wagner, H. J. Jameson.

Information and General Reception Committee—Chairman, F. C. Eichstaedt, 2998 W. Gd. blvd.; S. P. Brockway, Arthur Sutcliffe, G. A. Barrows, A. E. Shepherd, Sr., W. J. Patterson, J. Hay, Mr. Robinson.

Entertainment Committee—Chairman, W. W. McCord, 16209 Baylis avenue; H. M. Cherry, Geo. Kutzen, W. White, B. Lewis, J. Fritts, A. T. Wagner, Mr. Mayer, M. Beaubien, E. V. Allen, Chas. Cunningham, H. J. Jameson.

Exhibit Committee—Chairman, C. E. Marker, 5015 Dailey street; Secretary, Geo. Kuten; Wylie Berger, O. Gollnick, E. Hartz, F. C. Eichstaedt.

Ladies' Committee—Mrs. E. V. Allen, Mrs. C. M. Phillips, Mrs. H. J. Cherry, Mrs. Geo. Kutzen, Mrs. A. T. Wagner, Mrs. B. Lewis, Mrs. C. E. Marker, Mrs. F. C. Eichstaedt, Mrs. G. A. Barrows, Mrs. A. E. Shepherd.

PAPERS ON PLATING

The Papers Committee, headed by Mr. Jameson, has issued the following letter to all members of the society:

"We are hoping to enlist your aid in making this convention more than ordinarily helpful in providing up-to-date information on electroplating problems. We believe that an interchange of technical information between brother platers is one of the important features of any A. E. S. convention. Therefore we are requesting that you prepare a paper on the particular branch of electroplating in which you are specializing, or on a subject which you believe your experience fits you to write about. This is your opportunity to be of service to your society, and we trust that you will make a real effort to submit a paper for the Detroit convention.

"Please note that the final date for submitting papers is May 15, 1929." —C. M. Phillips, Secretary.

Baltimore-Washington Branch

HEADQUARTERS, CARE OF G. F. P. TURNER, 5324 MAPLE AVENUE, BALTIMORE, MD.

ANNUAL MEETING AND BANQUET

The Baltimore-Washington Branch, American Electroplaters' Society, will hold its annual meeting and banquet on Saturday, January 26, 1929. There will be a good program of papers on various phases of electrodeposition. A unique feature will be the issuance of a souvenir program with a history of the organizatin and an article by Dr. William Blum, well known in platers' circles, on the value of co-operation between the American Electroplaters' Society and the Bureau of Standards, with which Dr. Blum is connected. Those who plan to attend are urged to get in touch with the secretary, Mr. Turner, at the address given above, or with F. F. Pierdon, president, 925 E. Street, Northwest, Washington, D. C.

Chicago Branch

HEADQUARTERS, CARE OF S. J. C. TRAPP, 1127 NORTH SEVENTH STREET, MAYWOOD, ILL.

ANNUAL MEETING JANUARY 26

The annual meeting and banquet of the Chicago Branch, American Electroplaters' Society, will take place Saturday afternoon and evening, January 26, 1929, in the Louis XVI Room, Hotel Sherman, Chicago.

The educational session, which is expected to be one of the finest ever held, will begin promptly at 2.00 p. m. and last until about six, when those attending will enjoy a short period of rest previous to the banquet. The session is open to all who are interested in the electroplating and kindred arts.

Newark Branch

HEADQUARTERS, CARE OF R. F. CLARK, BOX 201, NEWARK, N. J.

Meetings of the Newark Branch, American Electroplaters' Society, were held November 16, December 7 and December 21, 1928, at Franklin Hall, 41 Franklin Street, Newark, the regular meeting place. At the first mentioned meeting (Nov. 16) 51 members and visitors were present to hear Guerin Todd, of the Hanson-Van Winkle-Munning Company deliver a highly instructive paper on Generators, and to join in a lively discussion of chromium problems after the lecture. The December 7 meeting was featured by discussion of pickling problems, gold and silver plating solutions and other topics of interest.

On December 21, Floyd F. Taylor, of the Hanson-VanWinkle-Munning Company, delivered a paper on Rheostats, a subject in which Mr. Taylor is an expert.

There have been a number of additions to the Branch's membership in the past few months, which has brought the total to more than 100.

New York Branch

HEADQUARTERS, CARE OF R. J. LIQUORI, 2429 HUBBARD STREET, BROOKLYN, N. Y.

The New York Branch of the American Electroplaters' Society will hold its nineteenth banquet and educational session on Saturday, February 16, 1929, at the Aldine Club, 200 Fifth Avenue, New York City.

The educational session will begin at 3.30 P. M. There will be a number of interesting and informative technical papers on various phases of the electroplater's art and all members and guests of the Branch are cordially invited to attend and partake in the discussions which will follow the papers.

At 7.30 the banquet will begin, and the arrangement committee promises a most unusual and entertaining event. After the banquet the floor will be cleared for dancing. There will be prize awards for ladies and gentlemen.

It is requested that reservations be made at least one week in advance, by communication with the secretary, R. J. Liquori, at the address given above.

American Electrochemical Society

HEADQUARTERS, CARE OF COLIN G. FINK, COLUMBIA UNIVERSITY, NEW YORK CITY

THE YEAR'S ACTIVITIES

The Society has passed through one of the most important years in its history. The spring meeting was held in Bridgeport, the noted brass and plating center of New England. The main session was devoted to a discussion of "Chemical Production of Electricity" in which some of the foremost authorities of the world participated. George W. Vinal of the Bureau of Standards presided. The Burgess Laboratories of Madison reported on "Graphitic Oxide as a Depolarizer for the Dry Cell." Dr. Marion Eppley outlined his process for making reliable standard cells of the Weston type, and M. L. Martus, president of the Waterbury Battery Company, described the construction of the new caustic soda primary battery. There were papers from Japan, Switzerland, and England. A very animated discussion followed and many disputed points were cleared up. Among other papers presented at this meeting mention should be made of the paper by Robert H. Leach on "The Melting of Sterling Silver in High Frequency Induction Furnaces;" "The Electroplating on Aluminum and its Alloys," by Harold K. Work of the Mellon Institute; "Electrodeposition of Thallium," by O. W. Brown and Sister Amata McGlynn; and a series of papers on chromium plating. The Round Table Discussion at this meeting concerned the selection of the best refractories for electric brass melting. Dr. B. D. Saklatwalla, vice-president of the Vanadium Corporation of America, presided.

The fall meeting was held in the new chemical center, Charleston-Huntington, W. Va. Among the papers that attracted particular attention was one on "Production and Use of Beryllium," by Dr. Kurt Illig, of the Siemens and Halske Company. Among other important papers were "The Nature of Gas-Metal Electrodes" by Profs. Sidney J. French and Louis Kahlenberg, of the University of Wisconsin; "Corrosion in the Tin Can," by Messrs. Roger H. Lueck and Harold T. Blair, of the American Can Company, San Francisco; "The Electrodeposition of Tellurium," by Prof. F. C. Mathers and H. L. Turner of the University of Indiana; "The Co-deposition of Copper and Graphite," by Colin G. Fink and James D. Prince of Columbia University; "The Electrometric Determination of Peroxide of Hydrogen and the Associated Peracids," by Prof. A. Rius of the Industrial School of Zaragossa, Spain. The Round Table Discussion at the fall meeting was concerned with the electrometallurgy of nickel alloys. Charles A. Styer of Pittsburgh presided, and Dr. William A. Mudge, metallurgist of the International Nickel Company, presented an outline of the various steps followed by his Company in producing pure nickel and monel.

At the fall meeting the Society formally accepted a generous gift of Dr. E. G. Acheson, of graphite and carborundum fame. The interest of the Acheson Fund is to be used in promoting electrochemistry. There will be an award of a gold medal and a cash prize of $1000.00 every two years for the most distinguished contribution to the advancement of electrochemistry. The awards will be made without distinction as to citizenship, race or residence. Shortly after the meeting, the board of the Society announced the acceptance of the Weston Fund, founded by Edward Weston, an electrochemist of world-wide repute, whose standard cell is the very foundation of our electrotechnical art. The interest of the Weston Fund will be awarded as a fellowship to candidates who have shown outstanding ability and aptitude for research in electrochemistry.

The coming spring meeting of the Society will be held in Toronto, Canada, May 27, 28 and 29, and one of the main sessions will be devoted to the discussion of the Electro-Magnetic Characteristics of Electro-Chemical Processes. Floyd T. Taylor, of Matawan, N. J., will preside at this meeting. Prof. W. Lash Miller is chairman of the local committee.

—COLIN G. FINK, Secretary.

International Fellowship Club

HEADQUARTERS, CARE OF FRANK J. CLARK, 43 FORT PLEASANT AVENUE, SPRINGFIELD, MASS.

THE YEAR'S ACTIVITIES

The year 1928 was marked by a number of pleasant events, beginning with the January meeting at Chicago, where increased membership was shown. This was followed by a meeting at New York in February, which was addressed by Frederick Space, who spoke on sales ethics from the point of view of the purchasing agent. His message was opportune. It lent inspiration to our members, who were assured that our organization is highly regarded by the National Purchasing Agents' Association as well as similar State organizations.

Our members are coming more and more to understand the need of engineering methods in the plating and finishing field. Especially with the advent of chromium plating has a high standard of sales engineering, equipment and technical control been made necessary.

The July convention at Toronto was well attended, a number of Canadian salesmen becoming members. One of these, William Wells, became vice-president of the Club, so that it has become truly international in scope. We look forward to a good Canadian delegation at the Detroit meeting, to be held together with the annual convention of the American Electroplaters' Society, which will take place there July 8 to 11, 1929.

For the coming year we look to increased membership. Practically all representative firms in the platers' and finishers' supply field are now represented in our membership, and we shall welcome to our ranks all those who have not yet joined.

To the electroplating and finishing industry as a whole the International Fellowship Club wishes a happy and prosperous New Year.

—FRANK J. CLARK, President.

Advancement of Science Association

Section M (Engineering)

HEADQUARTERS, 29 WEST 39th STREET, NEW YORK CITY

The eighty-fifth meeting of the American Association for the Advancement of Science was held in New York City December 27, 1928, to January 2, 1929.

Friday afternoon, December 28th, there was a joint session

with Section C (Chemistry). In addition to the technical sessions, there was a luncheon on Saturday with Dr. Michael I. Pupin as the principal speaker, and a reception at the Museums of Peaceful Arts after the afternoon session. The metals papers on the program are given below.

FRIDAY, DECEMBER 28th

Joint Session with Section C. Symposium: The Chemistry of Metals.

The Microscopic Structure of Metallic Alloys, by F. F. Lucas, Bell Telephone Laboratories, New York City.

Fatigue Strength and Elastic Strength of Metals, by H. F. Moore, University of Illinois, Urbana, Illinois.

Chemical Specifications in the Metal Industry, by John Johnston, U. S. Steel Corporation, New York City.

Corrosion of Metals as Influenced by Surface Films, by F. N. Speller, National Tube Company, Pittsburgh, Pa.

Light Alloys in Aircraft Construction, by E. H. Dix, Jr., Aluminum Company of America, New Kensington, Pa.

Materials Testing Society

HEADQUARTERS, 1315 SPRUCE STREET, PHILADELPHIA, PA.

REORGANIZATION OF COMMITTEE WORK

The formation of three new standing committees in the field of non-ferrous metals and alloys and the organization of a joint committee to coordinate the activities of the seven committees of the Society that will soon be functioning in that field, is one of the outstanding developments of the past few months.

COMMITTEE ON COPPER AND COPPER ALLOYS

A new standing committee has been formed from the membership of Sub-Committees II and III of Committee B-2, dealing respectively with wrought metals and alloys and sand-cast metals and alloys. Dr. C. H. Mathewson, Professor of Metallurgy, Yale University, has been designated by the Executive Committee to serve as temporary chairman, and N. L. Mochel, Metallurgical Engineer, Westinghouse Electric and Manufacturing Company, is serving as temporary secretary. It is tentatively planned that the committee will take over bodily the work of the two above-mentioned sub-committees of Committee B-2, and their chairmen, W. R. Webster, Bridgeport Brass Company, and N. K. B. Patch, Lumen Bearing Company, have consented to continue their chairmanships pending formal organization.

The provisional classification into producers, consumers and general interests, is as follows:

Producers	18
Consumers	13
General Interests	5
	36

It is planned to hold the formal organization meeting of the new committee in February during the meeting of the American Institute of Mining and Metallurgical Engineers.

TIN, LEAD AND ZINC-BASE ALLOYS

The new Committee B-6 will take over the work of Sub-Committee IV, of Committee B-2, on White Metals, including particularly specifications for babbitt and solder metals. The consideration of specifications for type metal will be within the scope of the new committee and there is evidence of some desire on the part of producers and users of type metal for the Society to consider the development of specifications. The personnel of Sub-Committee IV of Committee B-2 will be the nucleus of the membership of the new standing committee. The preliminary steps for the organization of this committee are being taken.

COMMITTEE ON LIGHT METALS AND ALLOYS

The new Committee B-7 takes over the activities of Sub-Committee VIII, of Committee B-2, on Light Metals and Alloys. Each member of that sub-committee was invited to serve on the new standing committee and J. B. Johnson, Chief, Material Section, Air Corps, Wright Field, Dayton, Ohio, was appointed by the Executive Committee to the temporary chairmanship. The provisional classification of the committee is as follows:

Producers	9
Consumers	9
General Interests	1
	19

Upon call of the temporary chairman, Committee B-7 met for formal organization on December 14 in the offices of the Westinghouse Electric and Manufacturing Company, at East Pittsburgh, and elected the following permanent officers: J. B. Johnson, chairman; E. H. Dix, Jr., vice-chairman; and J. A. Gann, secretary.

There was a general discussion of the work of the committee which led to the formation of the following sub-committees:

I. Aluminum and Aluminum Alloy Ingot and Rich Alloys. E. H. Dix, Jr., chairman.

II. Aluminum and Aluminum Alloy Sheets. R. J. Anderson, chairman.

III. Aluminum and Aluminum Alloy Structural Shapes. A. R. MacGregor, chairman.

IV. Aluminum and Aluminum Alloy Castings. V. Skillman, chairman.

V. Magnesium Alloys. J. A. Gann, chairman.

COORDINATING COMMITTEE ON METALS AND ALLOYS

The most important feature of this new set up in committee organization in the non-ferrous metals field, from the administrative point of view, is the formation of a Coordinating Committee on Non-Ferrous Metals and Alloys which in the beginning will be made up of two representatives to be designated by each of the seven committees having to do with non-ferrous metals. While this committee is to derive its powers from the standing committees represented upon it, it is planned that one of its most important functions shall be to coordinate the activities of the non-ferrous metals committees, adjusting questions of scope and jurisdiction, taking care of possible overlaps in committee activities and providing for joint activities where necessary. The studies of the Executive Committee have pointed to several important administrative matters that this coordinating committee should handle, and it is believed that this committee can be developed into an important administrative committee, guiding and directing the activities of the Society in the whole non-ferrous metals field.

Electroplaters and Depositors

HEADQUARTERS, NORTHAMPTON POLYTECHNIC INSTITUTE, ST. JOHN STREET, LONDON, E. C. 1, ENGLAND

SECRETARY'S ANNUAL REPORT

At the annual general meeting of the Electroplaters' and Depositors' Technical Society, of Great Britain, held on November 21, 1928, at Northampton Polytechnic Institute, London, Secretary S. Wernick presented the following report of the society's activities during the past session:

With the new session—the fourth in the existence of the society—well established, it once again falls to my pleasant duty to review in brief the activities of our organization for the session which ended last June. We have reason to be fully satisfied with the progress made. We have consolidated our now established position as the society devoted exclusively to the many phases of electro-deposition by the number of meetings held, the numbers attending those meetings, the character of the papers presented, and the animated discussions which have always followed these papers. The past session has seen marked progress in the newer developments outlined in the last secretarial report.

Membership—The increase in membership during the session is satisfactory as compared with last session, the number of new members elected being 48. During the session, there were a few resignations, while two members have died. Latterly, as the result of the circulation of a letter among those likely to be interested, explaining the aims and objects of the society, our numbers have been increasing at a very satisfactory rate.

Meetings—Ten meetings were held during the session, during which nine papers were presented for discussion. The policy of the committee has been to reduce the number of general discussion in favor of an increase in the number of papers followed by discussions, these papers generally con-

taining valuable and important facts and theories upon which the opinion and experiences of the meeting could be expressed. The discussions were thus of a more concentrated and valuable character. One "full-dress" discussion was, however, held on "The Composition and Control of Nickel Plating Solutions."

Conjoint meetings with kindred societies were held on three occasions. Membrs of the Institute of Metals and the Faraday Society being invited on the occasion of Mr. Ollard's paper on "The Theory of Chromium Plating," and the Institute of Metals again on the occasion of Mr. Macnaughton's paper on "Common Defects in Nickel Deposits."

The provincial meeting which has now become a regular feature in the society's sessional programme was held this year at Sheffield, the subject of the conference this time being appropriately the "Electro-deposition of Silver" for which Sheffield may claim to be the most important centre in this country.

Journal—The Journal, the impending publication of which was announced in the last report, is now a reality, the third volume having just appeared. There has been a progressive increase in the quantity of matter published with each succeeding session which has been paralleled by an enhancement in the quality of the papers presented.

Abstracts—In the matter of abstracts of literature dealing with electro-deposition, these have been regularly circulated throughout the session.

Work on Standardization—This work which has been proceeding during the session, is dealt with fully in the first Report of the Standards Committee which is presently to be submitted.

—S. Wernick, Secretary.

British Institute of Metals

HEADQUARTERS, 36 VICTORIA STREET, LONDON, S. W., 1., ENGLAND

ANNUAL MEETING DATE CHANGED

The council of the Institute of Metals has found it necessary to alter the date of the twenty-first Annual General Meeting and "Coming-of-Age" Celebrations of the Institute, from that originally announced (March 6 and 7) to March 13 and 14, 1929.

In addition to a dinner and dance at the Trocadero on March 13, an interesting function is being arranged for the second day of the meeting. This is a Conversazione and Exhibition to be held in the Science Museum, South Kensington, on March 14. Objects of special interest in relation to the work of the Institute will be displayed; offers of such objects are invited and should be made to the secretary, G. Shaw Scott, 36-38 Victoria Street, Westminster, London, S. W. 1.

The Annual May Lecture of the Institute is to be given on May 7, 1929, by Sir Oliver Lodge.

The Annual Autumn Meeting will be held in Düsseldorf, Germany, next September. Offers of papers for that meeting are invited by the council which, it is understood, will particularly welcome papers dealing with matters of practical interest. It is proposed also to hold at Düsseldorf a general discussion on laboratory methods of metallurgical research, in which speakers from many countries are expected to participate.

Applications for membership are now being submitted so freely, it is stated, that it is expected that the Institute's membership total will reach the 2,000 mark before long.

Brass Founders of New England

HEADQUARTERS, CARE OF H. E. BRYANT, 24 CHARLES STREET, WEST BRIDGEWATER, MASS.

A joint dinner of the Associated Brass Founders of New England and the New England Foundrymen's Association was held December 19, 1928, at the rooms of the former association in the Engineers' Club, Boston. This dinner was a Christmas party and farewell to Leroy P. Robinson, who had been secretary of the Brass Founders since its organization in 1926, who has left the New England territory, where he represented during the past 12 years the Werner G. Smith Company and the Sterling Wheelbarrow Company. He now goes to the Cleveland headquarters of the Smith company, where he will be sales manager. Mr. Robinson was presented with a fine traveling bag by his friends in the association. Among the evening's speakers were A. B. Root, past president of the American Foundrymen's Association, and Henry Blumenauer, president of the Arcade Malleable Iron Company, Worcester, Mass. Mr. Robinson presented Ray Hunter, who will succeed him in covering New England for the Smith company.

—H. E. Bryant, Acting Secretary.

Metals in the Automobile Show

The 1929 Automobile Show, held at the Grand Central Palace, New York, January 5-12, 1929, followed the same trend as the 1928 show. Automobiles are better built than ever, prices are lower and their appearance is more and more attractive. The severe competition among automobile builders is resulting in improvement in every possible direction.

The finish consists of metal trim wherever it will take hold. Highly polished electroplated parts are the fashion with chromium coming out in increasing volume.

The accessory field is undergoing a radical change. The independent accessory manufacturer is having a harder struggle as the automobile companies are ready to supply all of these parts which are necessary. They may be designated as "extras" but they are obtainable from the maker of the car. Consequently, the market for the hundred and one odds and ends, useful or ornamental, formerly made by small independent concerns, seems to be disappearing.

The large outlet for the accessory manufacturer seems to be to sell directly to the automobile makers.

A few concerns, in the metal industries, exhibited. Among those were:

Aluminum Company of America, Pittsburgh, Pa. Lynite pistons and rods.

Aluminum Industries, Inc., Cincinnati, Ohio. Aluminum alloy parts of various types.

Binks Spray Equipment Company, Chicago, Ill. Spray guns.

Black and Decker Manufacturing Company, Towson, Md. Grinders.

Bohn Aluminum and Brass Corporation, Detroit, Mich. Bohnalite pistons, rods, etc.; bearings and miscellaneous parts.

DeVilbiss Company, Toledo, Ohio. Spray guns.

Federal Mogul Corporation, Detroit, Mich. Bearings, bushings, etc.

Chemical Industries Exposition

The Twelfth Exposition of Chemical Industries will be held at the Grand Central Palace, New York City, the week of May 6 to 11, 1929. The Exposition draws together chemists, engineers, manufacturers and others interested from forty industries which are dependent in their operations upon a chemical change in the nature of the material or are under chemical control.

Brooklyn Polytechnic Exhibition

The Polytechnic Institute of Brooklyn, N. Y., held its "Open House" on January 11, when visitors were permitted to see its chemical, civil, electrical and mechanical engineering laboratories in full operation. Demonstrations included chemical manufacture, radio communication, high voltage display, x-rays, various kinds of power machinery, gas equipment, hydraulics and other experiments.

Copper in Human Diet Harmless

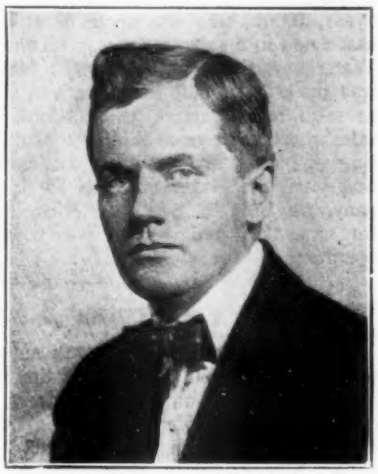
The results of three years of research by Drs. Frederick B. Flynn and William C. von Glahn, of the College of Physicians and Surgeons, Columbia University, New York City, have shown that copper, in the ordinary quantities contained in food and water used by humans, is not harmful or injurious to the system, and in some cases may even prove beneficial, it was announced last month.

Personals

Dr. Merica Awarded Douglas Medal

Dr. Paul D. Merica, director of research of the International Nickel Company, has been awarded the James Douglas medal for 1928. This medal is given each year by the Institute of Mining and Metallurgical Engineers for meritorious services in non-ferrous metallurgy.

Dr. Merica was born in Indiana, and received his early education in that state. He graduated from the University of Wisconsin, taking his degree in chemistry. He spent a year teaching in that university, and then spent two years at the Provincial College in Province of Chekiang, China.



DR. PAUL D. MERICA

In 1911 Dr. Merica went to Berlin where he studied under Professor Emil Fischer and then to the Technische Hochschule of Charlottenburg, Germany, where he worked under Professor H. Hanemann. It was there that he took his doctor's degree in chemistry and metallurgy. Dr. Merica returned to this country after five years' absence and did research work at the University of Illinois, later joining the metallurgical staff of the United States Bureau of Standards in Washington, D. C. He became assistant chief of the metallurgical division of the Bureau and remained there until 1919, when he left to become superintendent of research for the International Nickel Company.

In 1922 a new department of this company was formed, the Development and Research Department. Dr. Merica is now Director of Research for the International Nickel Company, New York City, and assistant manager of its Development and Research Department.

Dr. Irving Langmuir, assistant director of the research laboratory of the General Electric Company, Schenectady, N. Y., who was metallurgical editor of THE METAL INDUSTRY about twenty years ago, has been elected president of the American Chemical Society for the 1929 year. The choice of the Society's 17,000 members was made by the annual mail ballot. Dr. Langmuir, who succeeds Professor Samuel W. Parr of the University of Illinois as head of the Chemical Society, has gained wide recognition as the inventor of the high vacuum radio tube and as a student of involved scientific subjects.

E. G. Weed, for the past six years president and general manager of the Pyrene Manufacturing Company of Canada, Limited, joined the Pyrene Manufacturing Company, Newark, N. J., on January 1, 1929, in the capacity of vice-president in charge of sales and advertising. To many, Mr. Weed will be remembered through his more than twenty years' connection with the American Ever Ready Works and the National Carbon Company. In the years immediately prior to joining Pyrene of Canada, he served as western manager in charge of The National Carbon Company's Chicago offices.

August G. Hoffmann has opened offices as a consultant electropalter and industrial engineer, at 920 Summit Avenue, Jersey, City, N. J. Mr. Hoffmann has had thirty years experience in electroplating and some training in industrial engineering. He is offering a service well adapted to the needs of the small manufacturer who has a plating department and needs help to prevent and overcome difficulties.

Dr. Wheeler P. Davey, professor of physical chemistry, Pennsylvania State College, delivered the Robert Henry Thurston lecture before the American Society of Mechanical Engineers on December 6, 1928, at the Engineering Auditorium, New York City. His subject was "The Elastic Properties of Materials as Shown by Crystal Structure Investigations."

H. Abramson, for many years connected with the New York office of the Paasche Airbrush Company as sales and service engineer, has taken charge of the airfinishing division of the American Industrial Supply Company, 264 East 98th street, Brooklyn, N. Y. This company is an authorized distributor of Paasche airfinishing apparatus.

W. J. Holtmeier has been appointed to take charge of sales of the grinding division of the Hill-Curtis Company, Kalamazoo, Mich., grinding and polishing machinery manufacturers. For the previous twelve years Mr. Holtmeier was connected with the Hisey-Wolf Machine Company, Cincinnati, Ohio, serving in various capacities. He spent the last three years as general sales representative and advertising manager.

C. A. Dutton, formerly with The Carborundum Company, has become associated with The Ferro Enamel Supply Company, Cleveland, Ohio, as a member of its furnace department. **Raymond Harner** and **Curtis Watters,** both ceramic graduates of Ohio State University, have been added to the Engineering staff.

F. S. Markert, chief engineer for the Ferro Enamel Supply Company, Cleveland, Ohio, spoke on the "History and Development of Continuous furnaces for Porcelain Enameling," at the November meeting of the St. Louis District Enamelers' Club, St. Louis, Mo.

Arthur F. Moul has been elected a director and secretary of Samuel C. Rogers and Company, Buffalo, N. Y., makers of machine knife and saw grinders. Mr. Moul joined the Rogers organization in June, 1924, and has been manager for the past three years.

W. T. Griffiths, manager of the research and development department of the Mond Nickel Company, Ltd., recently came to this country to visit industrial centers and research organizations. He is still in the United States.

Dr. H. Ries, head of the Department of Geology, Cornell University, will act as technical director of the Committee on Molding Sand Research of the American Foundrymen's Association.

American Industrial Art Exhibit

Metal workers, finishers and manufacturers will be attracted to the forthcoming Exhibition of American Industrial Art, opening at the Metropolitan Museum of Art, Fifth Avenue at 82 Street, New York City, February 11, 1929. The bulletin of the Museum says of the exhibition:

"It will demonstrate, first, the close coöperation between the designer and the producer, particularly important in this instance because the designer will be, in each case, an expert functioning quite apart from the manufacturing establishment. Secondly, it will emphasize the importance of the architect as a source of design in many fields other than the design of buildings. The title "architect" will be interpreted in its true sense as an inclusive one, covering the entire conception of the building and its contents and, further, as described, a type of generalship in design by virtue of which many talents are marshaled under the banner of a leader, who is not master but guide and counselor, shaping many capacities to one end. All objects shown in this exhibition, the eleventh in the Museum series, will be of contemporary American design, and of American manufacture throughout. The groups shown will range from a backyard garden to a business office and from a man's den to a nursery." A great deal of metal will be shown in the exhibit.

Obituaries

Van Loan Whitehead

Van Loan Whitehead, chairman of the board of directors of Whitehead Brothers Company, Inc., Buffalo, N. Y., foundry supply distributors, died recently as the result of being struck by an automobile. He was 71 years of age and had been with the company since 1877, when he became associated with the firm's New York office. He went to Chicago five years later, and to Buffalo in 1884. At the latter city he opened an office which is still maintained there. At that time the company was still as founded, being known as Whitehead Brothers, a partnership of, Charles James, John and William Whitehead, the sons of Samuel Whitehead, who founded the firm. When the present company was incorporated in 1892 to take over Whitehead Brothers and the American Facing Company, Van Loan Whitehead was active in the work of consolidation and became one of the original directors. He was in turn secretary, treasurer, president and chairman of the board. As a representative of his firm he attended the first convention of the American Foundrymen's Association at Philadelphia in 1896. His firm is a charter member of that organization.

VAN LOAN WHITEHEAD

P. Samuel Rigney

P. Samuel Rigney, secretary and a director of the Roessler and Hasslacher Chemical Company, New York, died recently as the result of a stroke sustained while attending a directors' meeting of his company. He was 56 years old, a native of Orange County, N. Y., and had received a legal education as a young man. However, he did not remain in the law, having become interested in the chemical industry. In 1918 he became associated with Roessler and Hasslacher, where his success was rapid. He also had interests in other companies, and was an executive of the Niagara Electro Chemical Company, the Compressed Gas Manufacturers' Association and other organizations.

David Kaufman

David Kaufman, president of David Kaufman and Sons, Inc., Bayway, N. J., metal reclaimers, died at the age of 78 on December 13, 1928, following a surgical operation performed three weeks previous. Mr. Kaufman was widely known both as a metal man and as an active fraternal and civic worker. He came to this country from Russia as a youth, and after a short while here he went into the metal reclaiming line. In 1876 he founded the firm of Isaacs and Kaufman, as a partner of the late Hyman Isaacs, of Elizabeth, N. J. This firm was amicably dissolved in 1891 and Mr. Kaufman formed the present business, in which his seven sons are now active. This company has carried on very extensive metal reclaiming operations.

A. Vinton Cobb

A. Vinton Cobb, jewelry manufacturer, of Attleboro and Providence, R. I., died on November 19, 1928, after a surgical operation. He was born 79 years ago at Attleboro, where he spent his entire life. There he entered the jewelry industry, working his way up from the bench to a very successful place as one of the heads of the W. R. Cobb Company, in which he was a partner with his brother. In 1922 he retired, following his brother's death. He had an enviable reputation for sound business principles and the highest integrity.

Theodore F. Baker

Theodore F. Baker, sales representative of the American Brass Company, Waterbury, Conn., died on December 9, 1928, at Philadelphia, Pa., where he resided.

Mr. Baker, who was about 67 at the time of his death, became associated in a sales capacity with the Waterbury Brass Company, Waterbury, Conn., more than 30 years ago. When this company was made a part of the American Brass Company, he continued as sales representative at Stamford, Conn. Later, he was made sales representative at Philadelphia, where he remained until the time of his death. He was a native of the latter city. On several occasions Mr. Baker acted as foreign representative of his company, traveling to South America. He had been in poor health for some time and recently was compelled to undergo a surgical operation.

Archer J. Smith

Archer Jerome Smith, 72, president of the American Mills Company, and president-treasurer of the Waterbury Buckle Company, died at his home on Prospect street, Waterbury, Conn., on December 11, 1928. He was born in that city, the son of Earl and Ellen (Scott) Smith, educated there and at the Williston Seminary. The American Mills Company was organized in 1881 by his father, who had also acquired a considerable interest in the Waterbury Buckle Company. Archer Smith was made secretary and treasurer of the American Mills Company and on his father's death succeeded him as president and also as president and treasurer of the Waterbury Buckle Company. He is survived by his wife, two sons, Maltby Smith of California and Julius B. Smith of Waterbury, and two daughters, Mrs. Roy Wilcox of Meriden, and Alice L. Smith of Waterbury. —W. R. B.

H. Blanchard Dominick

H. Blanchard Dominick, for 58 years the senior member of Dominick and Haff, New York City, silversmiths, died last month in his eighty-first year. Mr. Dominick, one of the oldest and most prominent men in the silversmith industry, had been ill for some time. Last February he retired from active business because of his failing health.

Mr. Dominick, a Hugenot by descent, entered the silversmith business at 15, with Gale and Company, New York City. Seven years later the firm became Dominick and Haff, which it has remained ever since.

William Wasweyler

William Wasweyler, Milwaukee, Wis., president of the Milwaukee Brass Company, died at the Stratford Arms Hotel in that city on December 1, 1928, from heart disease. Mr. Wasweyer was 64 years of age.

James Harvey

James Harvey, president of A. Harvey's Sons Manufacturing Company, Detroit, Mich., one of the city's oldest companies, died December 9, 1928, after several years of poor health. He was 78 years old and had lived practically all of his life in Detroit.

The company with which Mr. Harvey was associated for 58 years was founded in 1833 by Solomon Davis, brass founder. In 1855 it was purchased by Andrew Harvey, Sr., who made his son, Andrew, Jr., a partner in 1860. In 1870 James, second son, was also made a partner.

Thomas A. DeVilbiss

Thomas A. DeVilbiss, president of the DeVilbiss Company, Toledo, Ohio, manufacturers of spraying equipment, died recently at that city. He was 50 years of age and had been in poor health for some time.

News of the Industry

Industrial and Financial Events

Abrasive Company's Sales Conference

Abrasive Company, Philadelphia, Pa., manufacturers of grinding wheels, polishing materials, etc., held a highly successful sales conference at Philadelphia, December 3-5, 1928. The conference, under the direction of S. M. Hershey, sales manager, took place at the Penn Athletic Club, with meetings also at the company's new plant at Bridesburg, Pa., which was inspected. The sales

ABRASIVE COMPANY'S SALES FORCE

representatives then were shown a grinding demonstration at the Abrasive Mechanical Laboratory, with actual production work on view. There were a number of sessions for discussion of various abrasive problems as related to sales. These sessions proved highly instructive, men from various parts of the country giving their experiences and many ideas being laid before the collected group. Policies for 1929 activity were decided upon also. The conference ended with a dinner dance at the Club, which was attended by the salesmen, the entire office force and their ladies, as well as a number of visitors.

Brass Merger Approved

The directors of the Rome Brass and Copper Company, Rome, N. Y., have approved the merger of the company with Taunton-New Bedford Copper Company, of Taunton and New Bedford, Mass.; the Baltimore Sheet Mill, of the General Cable Company; the Rome Manufacturing Company; the Michigan Brass and Copper Company, Detroit; the Dallas Brass and Copper Company, Chicago, and the Higgins Brass and Manufacturing Company of Detroit. As reported in our previous issue, the new company to be formed is to be known as the General Brass Corporation, which, it is expected, will control about 20 per cent of the country's fabricated copper and brass business.

Nickel Companies Plan Merger

The International Nickel Company of Canada, Ltd., which recently acquired the physical assets of the International Nickel Company of New Jersey, has made an offer for the purchase of the Mond Nickel Company, Ltd., of England, it was announced on December 20, 1928.

The acquisition of the New Jersey company by the Canadian International company was stated to have been in preparation for the present merger proposal with the Mond company. According to reports in financial circles, the merger would give the International Nickel Company virtual control of the world's nickel supply, eliminate duplications of operations and make for more economical production of the metal.

Wilckes-Martin-Wilckes Company

The annual dinner and entertainment of the employees of the Wilckes-Martin-Wilckes Company, Camden, N. J., phosphate manufacturers, was held December 11, 1928. It took the form of a Christmas party, as well as a testimonial to John J. Heck, newly appointed general superintendent of the firm's Camden works. Music was furnished by employees at the New York offices and at Camden, with Edward Van Berlo in charge of the program. The speakers were President Ferdinand Wilckes, Luther Martin, John J. Heck and George T. Short.

American Brass Company

The Hastings-on-Hudson plant of the American Brass Company, used for the manufacture of copper wire and cable, is being rebuilt in order to bring it up to the most modern standards for such plants. New insulating, drying, impregnating and other machinery is being installed, as well as a testing laboratory capable of performing all necessary research.

The plant, located at Hastings, N. Y., was originally operated as the National Conduit and Cable Company and is one of the oldest such plants in the country. It has been producing about 100,000,000 pounds of products per year, including wire, cable and coverings.

The American Brass Company also plans elaborate improvements at its Canadian plant, formerly known as Brown's Copper and Brass Rolling Mills, New Toronto, Canada, where permanent Canadian headquarters will be. The land and buildings, as well as the business, are now owned by Anaconda Copper Mining Company, of which American Brass is a subsidiary. Over a million dollars will be spent there, it is stated.

Lead Companies in Merger

The Chadwick Boston Lead Company, which has just completed its 100th anniversary as a separate corporation, has formally consolidated with the National Lead Company of Massachusetts for the purpose of effecting various economies in the manufacture and sale of its products. From the merger a new corporation is to be formed to be known as the National Boston Lead Company. There will be no change in policy management or personnel. The Chadwick Boston Lead Company was formed in 1829 as the Boston Lead Company, taking its more recent name at a reorganization in 1901.

Inland Wire and Cable Company

According to reports from Chicago, the Anaconda Copper Mining Company, parent concern of the American Brass Company, Waterbury, Conn., is carrying on negotiations for the purchase of the Inland Wire and Cable Company, Sycamore, Ill., formerly the Chicago Insulated Wire and Manufacturing Compny. It is stated that details or terms have not yet been taken up. The Inland company is headed by A. B. Gochenour, president; A. A. Mueller, treasurer; and L. R. Love, secretary. It is capitalized at $2,000,000 and produces copper wire and cable.

Process for Plating Wood, Paper, Etc.

A London dispatch to the New York Herald Tribune of January 7 stated that the Einstein Electro-Chemical Process, Ltd., a British concern, has issued a statement that it had perfected a process whereby non-conductors of electricity such as wood, paper, fabrics, threads, etc., could be electroplated and made as strong as iron, resistant to corrosion and other deleterious actions, so that materials formerly unusable in some lines is now made available to them.

Metals Duty-Free in Germany

Effective February 1, the German Government will cease collecting duty on imports of non-ferrous scraps and semi-finished material. Placing these materials on the free list is expected to increase that country's imports, with resultant better exports from the United States.

Bohn Aluminum and Brass Company

The Bohn Aluminum and Brass Manufacturing Company for the nine months ended on Sept. 30, 1928, shows a net profit of $2,472,087 after all charges. This compares with $897,083 in the same period in 1927. Net income for the September quarter was $827,998 against $276,083 in the same quarter of 1927.

The Metal Exchange Opens

International Newsreel Photo

ON THE FLOOR OF THE NEW METAL EXCHANGE IN NEW YORK CITY—SCENE DURING THE TRADING PERIOD

Gold Leaf Production

The Department of Commerce, Washington, D. C., announces that, according to data collected at the biennial census of manufactures taken in 1928, the establishments engaged primarily in the manufacture of gold leaf, for sale as such, in 1927, reported gold leaf, valued at $2,726,396, and all other products, valued at $844,794, making a total of $3,571,190. This total represents a decrease of 4.7 per cent as compared with $3,745,807 reported for 1925, the last preceding census year. The products of this industry consist principally of gold leaf, for use by sign painters, bookbinders, decorators, etc., but do not include dental gold, which is treated as a product of the "Dental goods" industry.

Hall Millions for Oriental Schools

Charles M. Hall, famed "Father of Aluminum," whose will directed that a $10,000,000 residuum of his estate be used for educational purposes in the Near East and the Orient, is to be the benefactor of twenty-one institutions in Japan, continental Asia, Turkey and the Balkan states, according to an announcement by the trustees on December 28, 1928. Mr. Hall died in 1914, at Niagara Falls, N. Y. He was the inventor of the process by which aluminum is produced, and was a major stockholder in the Aluminum Company of America and allied corporations. The principal part of his estate was distributed several years ago, but $10,000,000 remained until the present decision was reached.

British Tin Production

A report to the Department of Commerce, Washington, D. C., on the British tin trade, says:

During the first half of 1928, of the total world supply of tin, 65.7 per cent was produced and smelted in the British Empire, against 63.1 per cent in the first half of 1927—another interesting feature of the tin industry. At the same time, 24.3 per cent of the total world supply was produced in foreign countries but smelted or refined within the Empire, as compared with 22.7 per cent. Thus, the quantity of tin produced and smelted in non-British countries declined during the year from 14.2 per cent of the world's total to 10 per cent.

Cutlery and Edge Tools

The Department of Commerce, Washington, D. C., announces that, according to data collected at the biennial census of manufactures taken in 1928, the establishments engaged primarily in the manufacture of cutlery (not including silver and plated cutlery) and edge tools in 1927 reported products valued at $76,688,444, a decrease of 4.5 per cent as compared with $80,263,252 for 1925, the last preceding census year.

Civil Service Examination

The United States Civil Service Commission announces the following open competitive examination: **Senior Physical Metallurgist**—Applications for senior physical metallurgist must be on file with the Civil Service Commission at Washington, D. C., not later than January 23, 1929.

The examination is to fill a vacancy in the Bureau of Standards, Department of Commerce, Washington, D. C., and vacancies occurring in positions requiring similar qualifications. The entrance salary is $4,600 a year. Higher-salaried positions are filled through promotion.

The duties are to conduct research or investigative work in physical metallurgy in connection with the control of the properties of metals and their alloys and the methods of testing such properties. This investigative work will involve a study of problems such as the following: Metallurgy of magnet steels, the properties of pure iron-phosphorous alloys, liquid shrinkage of alloys, and X-ray crystal structure of alloys.

Competitors will not be required to report for examination at any place, but will be rated on their education, training and experience, writings to be filed by the applicant. Full information may be obtained from the United States Civil Service Commission, Washington, D. C., or from the secretary of the United States Civil Service Board of Examiners at the post office or custom house in any city.

Carson to Enter Machinery Field

George Campbell Carson, well known throughout the country due to his long litigation with large smelting companies over his patents on smelting machinery, on which he recently won a claim of $20,000,000 against the Anaconda Copper Mining Company, will soon begin the organization of a manufacturing company which will produce his inventions. His principal machine is the side-feeding reverberatory furnace, which has been widely adopted by smelters.

Clocks, Watches, and Parts Manufacture

The Department of Commerce, Washington, D. C. announces that according to data collected at the biennial census of manufactures taken in 1928, the establishments engaged primarily in the manufacture of clocks, watches, and parts in 1927 reported products to the value of $85,391,842, an increase of 4.4 per cent as compared with $81,789,729 for 1925, the last preceding census year.

Carboloy Gaining Wide Renown

Carboloy, the new cutting material, which was fully described in THE METAL INDUSTRY for December, 1928, page 532, is being widely tested by machine tool manufacturers and other concerns. The wide recognition it is gaining is made evident by the fact that the New York Herald Tribune carried a long front-page story about it on January 7.

Mechanical Man Made of Aluminum

Eric, the Robot or mechanical man, recently brought to this country from England by Captain W. H. Richards, was on view in New York on January 3. The man-shaped mechanism is made of aluminum, weighing about 140 pounds, and has the appearance of a knight in armor. It has a voice and is able to walk, according to the inventor.

Incorporations

United Metal Manufacturing Company, Inc., Norwich, Conn., has been chartered to take over the business of that name. Brass, bronze and aluminum foundry, brass machine shop, casting room and tool room are operated.

Philadelphia Nonferrous Foundry Company, Philadelphia, Pa., organized by Edward W. Taylor, Jr., 3030 Queen Lane, Philadelphia, and associates, to operate plant for production of aluminum, brass, bronze and other metal castings. Andrew R. McCown is also interested in the company.

Business Reports of The Metal Industry Correspondents

New England States

Waterbury, Conn.

January 2, 1929.

Waterbury brass mills are especially prosperous at the present time and there is every indication of renewed prosperity the coming year, all heads of local industries declare. The month of November, according to the manager of the local railroad division, saw the greatest shipment of tonnage from the local yard of any month since the war.

"Prospects were never better in New England," says **E. O. Grss**, president of the **Scovill Manufacturing Company.** "The whole country's prosperity is excellent and the prospects for 1929 are excellent. This general prosperity is shared by the rank and file for unquestionably the present state of prosperity is more evenly spread than has been the case in the past."

'Indications for business for the first part of 1929 are excellent," says **John A. Coe**, president of the **American Brass Company.** "There are various elements which may influence the middle and later part of the year but at present it would seem reasonably safe to estimate a good prospect for the entire year. There is no logical reason why New England should not hold her own when compared with the rest of the industrial world. The result will depend a very great deal upon the sagacity of the industrial leaders now in the saddle and upon their application of humanitarian impulses to the problems as they arise, as well as upon the intelligence and alertness of the younger men who are now being trained for future leadership. If the people of New England follow the general idea there is no reason why this area should not make even greater progress than in the past."

"The country is more than ordinarily prosperous and we see no reason to anticipate a change from the present favorable condition," is the opinion of **F. S. Chase**, president of the **Chase Companies, Inc.** "New England, we believe, will hold her own in the industrial world. This does not mean that she will necessarily continue to retain the same proportion of country-wide business as she has in the past, but will hold her own relative to other districts and the volume of her business will tend to increase rather than to decline. We believe that the average man today is getting higher wages, is able to get and is getting more of the luxuries than in any other period in history, due to the intense competition and consequent small margin of profit. If people are not saving as much as formerly it is probably due to the fact that they are following Henry Ford's advice rather than Ben Franklin's."

Industrial events of the past year in Waterbury included: Announcement by the **Chase Companies** of their intention to erect a brass mill in Cleveland; purchase by the **American Brass Company** of the land and plant of the **Brown Copper and Brass Company** in Toronto, Can., previously occupied under lease; adoption by the **Chase Companies** of a new trade mark, showing a centaur drawing a bow; increase in the capital stock of the **Waterbury Fastener Company** from \$50,000 to \$250,000; erection of a \$75,000 addition by that company; erection of a \$45,000 addition by the **French Manufacturing Company** and plans for another; erection of a \$75,000 addition by the **Seymour Smith Manufacturing Company;** consolidation of the **Robinson Tool Works** of this city with the **Cole Lock Nut Company** of Poughkeepsie, under the name of the **Robinson-Cole Grip Nut Company,** a \$125,000 corporation; purchase of the **Woolson Manufacturing Company,** of Watertown, by the **Federal Manufacturing Company;** purchase of the **Waterbury Steel Ball Company** by the **Shatz Manufacturing Company** of Poughkeepsie; purchase of the **Berbecker and Rowland Manufacturing Company** by the **Beardsley and Wolcott Manufacturing Company,** making the latter a \$1,500,000 corporation; adoption of the nine-hour day by the **Chase Companies;** winding up of the affairs of the **Carroll Wire Company** bankruptcy; purchase by the **American Fastener Company** of the garter trimming business of the **Warner Brothers;** issuance by the **Federal Trade Commission** of an order restraining the **Waterbury Clock Company** from maintaining the resale price on watches; sale by the **Waterbury Button Company** of its ivory button business.

Chase Companies, Inc., new brass mill site in Cleveland will be in Euclid Village on the New York, Chicago and St. Louis Railroad. Sixty acres were purchased, it is understood, at a price said to be around \$150,000, from the **Van Sweringen Company.** Work has begun on the first unit.

Directors of the **Scovill Manufacturing Company** have declared a quarterly dividend on the common of 75 cents a share, payable Jan. 1 to stockholders of record December 20. The payments the last two quarters were each 75 cents while during the two previous quarters the payments were but 50 cents.

An out of town industrial concern is negotiating for the purchase of the old **New England Watch Company** plant, now owned by the **Waterbury Clock Company.** This was originally the **Waterbury Watch Company's** plant and was later owned by the **Ingersoll Watch Company.** The **Waterbury Clock Company** transferred all operations to its main plant about a year ago. The price asked for the plant is between \$200,000 and \$250,000.

Reports of the forming of the **Republic Brass Corporation** through the consolidation of the **Rome Brass and Copper Company,** and other companies has evoked the interest of local brass men. **F. S. Chase,** president of the **Chase Companies,** when asked for a comment, said the merger probably will bring into existence the second strongest copper and brass combine in the world, and agreed that the report that it would bring 20 per cent of the country's brass and copper business under one organization is probably correct. **E. O. Goss,** president of the **Scovill Manufacturing Company,** said the merger will afford a strong combination, beneficial to the industry. About the report that the combination has sought to include the **Scovill Company,** he would not say, except that if there had been any negotiations of that nature they were too long ago to be of news interest. **John A. Coe,** president of the **American Brass Company,** said his company had not considered seriously the purchase of the **Michigan Brass and Copper Company.** It bought the **Detroit Copper and Brass Company** about a year ago.

Reports from the **Department of Commerce** show that of the 127 clock and watch establishments in the country, 13 are in Connecticut, which stands fourth on the list being exceeded only by New York, Illinois and Massachusetts.

The French Manufacturing Company has been refused a permit to erect its second addition during the year on the ground that the site proposed was in a residential zone and the work was consequently forbidden by the zoning ordinance. However, this will not prevent the erection of the addition, as the company can erect it in an adjacent spot, which is in an industrial zone.

Local manufacturers are protesting to the **Interstate Commerce Commission** against a proposed ruling that will allow lower freight rates for shipments from Bridgeport, Norwalk, New Haven and Stamford than will be allowed Waterbury, Bristol, Danbury, New Britain and Hartford by drawing an arbitrary line across the state.

J. W. Brown, John J. Baker, P. S. Buckley and P. J. Cronan, representing the **Chase Companies,** Archer Rowbottom and Edward Rahn of the **Rowbottom Machine Company,** Judson Smith and Hyman Cassell of the **Patent Button Company,** Archibald Duffield of the **Steele and Johnson Company,** Henry Ackerman of the **Bristol Company,** A. W. Grele and Andrew Smea of the **Seymour Smith Company,** H. Farrell of the **Oakville Company,** J. Byron of the **American Ring Company,** B. F. LaVigne of the **Chromium Corporation,** George Brooks and William Frink of the **American Pin Company,** Eugene Carey, Adolph Nadeau and William Nugent of the **Waterbury Manufacturing Company,** Joseph Coscia, Edward Davis, John Fletcher, F. H. Vickery, F. A. Brown and M. Griffin of the **Scovill Manufacturing Company,** George Roden of the **Waterbury Clock Company,** W. E. Watts of the **Noera Manufacturing Company** and G. A. Wildman of the **Apothecaries Hall Company,** were among the traffic and shipping representatives who took part in the tour of inspection of the freight handling facilities of the New Haven road and asso-

ciated shipping lines in New York City, harbor and vicinity as guests of the railroad last month.

The compensation court has ordered the **American Brass Company** to pay the widow of **William Kindt,** killed in its plant last summer, the sum of $6,093.57. He was killed by an overhead crane.

John H. Goss, vice president of the **Scovill Manufacturing Company,** was one of the principal speakers at the annual dinner of the state traffic men's association in New Britain last month.

The Chase Companies, Inc., have opened four extension classes for their employes in the rooms of the Foremen's Association. Lectures will be given under the auspices of the Y. M. C. A. Over 100 have already enrolled.

A local business man, name unknown, has offered to donate $1,000, provided $50,000 can be raised to advertise Waterbury in magazines and papers throughout the country, stressing its products and industrial advantages.

Among local men who obtained patents last month are the following: **Jeremiah Martone,** grinding machine; **Gunnard Peterson,** assignor to the **Risdon Manufacturing Company,** automatic machine work transferrer; **Clifford Petitjean,** assignor to the **Waterbury Farrel Foundry,** transfer mechanism for upsetting machines; **Forrest Purinton,** assignor to the **Patent Button Company,** cleaning flexible foraminous sheets; **Paul Fenton,** assignor to the **Scovill Manufacturing Company,** floating trim stud; **George Anderson** and **Henry Wild,** assignors to the **Scovill Manufacturing Company,** two patents for lip stick containers; **Morris Bennett,** assignor to the **Scovill Manufacturing Company,** condenser. —W. R. B.

Bridgeport, Conn.

January 2, 1929.

In spite of the rather pessimistic viewpoint that prevailed at the beginning of last year, local metal plants and other factories enjoyed practically a normal year. There was a gradual falling off from early spring until late summer, but since then there has been such a steady increase that the prospects are for a still greater volume this year.

Events of last year in local industry included the erection of a $500,000 plant of the **United States Aluminum Company,** not yet quite ready but expected to be ready for occupancy in February; erection of a $32,000 addition to the plant of the **Bullard Machine Tool Company;** merger of the **Habirshaw Cable and Wire Company** with the **National Electrical Products Corporation** of New York; erection by the **American Tube and Stamping Company** of an addition 40 by 100 feet; acquisition by the **Bassick Company** of this city of the **Columbia Phonograph Company** plant at a price said to be $300,000; purchase of the **Wright Manufacturing Company** of Lisbon, O., by the **American Chain Company** and the building by the **Baird Machine Company** of a 100 by 150 foot addition at a cost of $80,000. A reorganization of the **Bridgeport Brass Company** took place early in the year; **Carl Dietz,** president, and **R. T. Kent,** general manager, resigned and **Charles E. Beardsley** of the **Beardsley and Wolcott Manufacturing Company** of Waterbury was elected president and **Ralph E. Day, superintendent** of the **American Brass** plant at Hastings, N. Y., was elected general manager. Three new directors were added, **George Wigmore, P. D. Hamilton** and **R. W. Phillips** of Waterbury. Soon after this the directors increased the stock from 35,000 to 36,500 shares, the par value being $100.

The Bridgeport Brass Company is planning to erect a new rolling mill early this year but the size and the time when it will be started have not yet been decided. Increased business during the last part of the year and a prosperous outlook for next year make the addition necessary.

The Crane Company has plans for a new building 125 by 500 feet and the foundations have been started. The company is transferring to this city the business of making radiators for home heating, now carried on at plants in other cities. This is expected to add 25 per cent to the concern's present working force.

The contract has been awarded for the construction of the $450,000 factory of the **Sikorsky Aircraft Corporation** in Stratford, just outside of Bridgeport. It is expected this will mean the employment of 1,500 mechanics and workmen and a payroll of over $1,000,000 weekly.

The Bridgeport Hardware Company is preparing an addition to contain 4,500 square feet of floor space. It will be one story and adjoin the company's present plant.

The American Tube and Stamping Company has taken out a permit for the erection of a $45,000 addition to be put upon Stratford avenue.

Disposal of some of the machinery of the **Locomobile Company** plant and reported dissatisfaction with the tax assessment led to the report that the company planned to leave the city. **George E. Daniels,** vice-president and general manager of the company, denies this, saying that it will add considerably to its working force this year. Machinery shipped away was that used for the manufacture of standard parts now made by Durant plants elsewhere, he said.

Workers of the **Crane Company** plant shared in a bonus distributed at Christmas amounting to five per cent of a year's salary, $135,000 being given out.

In addition to the regular dividend of 37½ cents a share, **Bullard Machine** directors last month declared a special dividend of $1 to stockholders of record December 20.

Among patents granted to local men during the past month are the following: **Edward Bullard,** two on a turret head for machine tools and a power chucking device, transferred to the **Bullard Machine Tool Company; Arthur Lewis,** power chucking device, transferred to the **Baird Machine Company; Arthur Gaynor,** electric switch; **Edward Conner,** assignor to **American Cable Company,** stranding machine.

Harry B. Curtis, treasurer of the **Bridgeport Hardware Manufacturing Company,** has returned from a trip to Japan and China. Bridgeport products are not well represented there, he reports, urging that there is a wide field there if local business men will go there in person to introduce their wares.

Payroll figures for local factories for November show a 12 per cent increase over the same month last year and a number of factories are now working 24 hours a day, according to the Chamber of Commerce figures. —W. R. B.

Connecticut Notes

January 2, 1929.

The year just closed witnessed many expansions and mergers in a wide diversity of industries throughout the state. One of the principal ones was the merger of the **Arrow Electric Company** and **Hart and Hegeman's** of Hartford, forming the **Arrow-Hart and Hegeman Company,** a $2,000,000 corporation, said to be the largest manufacturer of brass and copper wire in the country. The **Federal Trade Commission** has filed complaint against it on the ground that it lessens competition and its dissolution is under way, to be followed, it is said, by some other form of consolidation. **Billings and Spencer Company** has been reorganized and new stock issued to replace not only the old but also to retire all notes and unsecured loans and all bonds. During the year the **Pratt and Whitney Manufacturing Company** of Hartford perfected a new automatic machine for producing gears. **Veeder Manufacturing Company** of Hartford and the **Root Company** of Bristol merged into **Veeder-Root, Incorporated.** Both produce mechanical counting and recording devices.

In New Britain during the year, **Landers, Frary and Clark** built a $100,000 addition. **Goss and De Leeuw Machine Company** of that place increased its stock from $200,000 to $250,000 and built an addition. The stockholders of **Landers, Frary and Clark** elected **Harris Whittemore, Jr.,** of Naugatuck to succeed the late **Harris Whittemore, Sr.,** as a director. An addition was built to the **Fafnir Company** plant, nearly doubling its size.

In Bristol, the **E. Ingraham Clock Company** built a $200,000 addition to its plant and the **New Departure Company** built a $1,000,000 addition. **Bristol Brass Company,** which for several years had passed dividends on its preferred as well as common stock, resumed dividends on the preferred during the year.

In Torrington, the **Torrington Company** increased its capital from 280,000 to 560,000 shares, issuing two shares of new to each share of old held by the stockholders. It later reduced its capitalization from $11,000,000 to $7,000,000 by retiring 40,000 shares of preferred and 120,000 shares of common. **Christian Hoerle,** superintendent of the **Union Hardware Company,** died during the year.

In Terryville, the **Eagle Lock Company** for the first time in

some years failed to declare the extra dividend usually given in the middle of the year.

A four story addition to the **Seth Thomas Clock Company** factory in Thomaston was built during the year. Two airplane factories located in Naugatuck, the **Aeronautical Products Company** and the **Kimball Aircraft Corporation. Universal Wire Company** and the **Wire Machinery Corporation** of New Haven merged, forming the **Wire Machinery Corporation of America,** capitalized at $50,000. The **Yale and Towne Company** of Stamford purchased the **Damm Ludwig Company** of Velbert, Germany.

International Silver Company during the year increased its stock from 60,798 to 91,197 shares, allowing one-half share of new to be purchased for each full share held at $110 a share. It acquired the hollowware business of **E. G. Webster & Sons** of Brooklyn. **George Wilcox,** president of the company, resigned and was succeeded by **Clifford Gardner.**

HARTFORD—The Pratt and Whitney Aircraft Corporation has consolidated with the **Chance Vought Corporation** of Long Island City and the **Boeing Airplane and Transport Corporation** of Seattle, Wash., under the name of the **United Aircraft and Transport Company,** a $150,000,000 corporation. **William Boeing** will be chairman of the board and **Frederick Rentschler,** president of Pratt and Whitney, will be president of the new corporation. **Chance Vought** will be vice-president and **Charles Deeds,** secretary and treasurer.

Earnings of the **Standard Screw Company** are reported to be $16 a share this year. An extra dividend of $2 a share is expected to be declared.

Initial steps in the liquidation of the **Arrow-Hart and Hegeman Company** were taken by the stockholders last month. Resolutions were adopted authorizing the transfer of the stocks back to the original companies. New stock will be issued to replace this and the company will be dissolved. This was merely a holding company and it is understood that actual consolidation will now take place and a new company owning all the assets of the two concerns will result.

H. H. Vreeland, chairman of the board of the **Royal Typewriter Company,** was bequeathed $50,000 by the late **Thomas F. Ryan.** He was the latter's business secretary. **Allan A.** Ryan, who was disinherited by his father, was prseident of the local company in 1910 and 1911. **Glendennin Ryan,** another son, is now a director of the local company.

Directors of **Colt's Patent Fire Arms** have declared the regular dividend of 50 cents a share, payable December 31.

NEW BRITAIN—A special Christmas dividend of three per cent was declared by the **Stanley Works,** payable December 17 to stockholders of record December 7. The regular quarterly dividend of 2 per cent was voted payable January 2 to stock of record December 7, and one and one-half per cent was declared on the preferred, payable February 15 to stock of record February 2.

The American Hardware Corporation directors declared the regular quarterly dividend of four per cent and an extra dividend of $1 a share, payable January 1 to stockholders of record December 20.

Landers, Frary and Clark directors declared the regular quarterly dividend of three per cent and an extra dividend of $1 a share, payable January 1 to stockholders of record December 20.

Directors of the **Fafnir Bearing Company** voted the regular quarterly dividend of two per cent and six per cent in extras. Payments of four per cent or $1 a share was made December 15 to stockholders of record December 10 and the balance, 50 cents regular and 50 cents extra, was paid December 31 to stockholders of record December 24.

Directors of **Hart and Cooley, Incorporated,** declared an extra dividend of $1.50 a share, in addition to the regular quarterly dividend of $1.25 and another extra of 50 cents a share payable December 31.

The Wilcox-Crittendon Company, manufacturers of marine hardware, announce promotions among the personnel as follows: **Harry Pratt,** for 21 years an employe of the company, promoted to assistant general manager; **James O. Lord** was made purchasing agent, the position held by Mr. Pratt for 16 years; **Henry Hanson** was made factory manager; **Earl Doebner,** traffic manager; **John Gannon,** sales manager; **James Hayes,** head of the cost department; and **Richard Peryham** head of the advertising department.

Traffic managers of the **American Hardware Corporation, Landers, Frary and Clark,** the **Stanley Works** and other local concerns were hosts last month to steamship and railroad executives from all parts of New England, the object being to secure greater efficiency in shipping local manufactured products.

The Patent Commissioner has dismissed the complaint made by the **Apex Electrical Manufacturing Company** of Cleveland to the use of the trade name, "Roto-Verso" on the washing machines made by **Landers, Frary and Clark.** The Cleveland concern uses the name "Rota-Rex." The commissioner held that there is sufficient dissimilarity between the two names.

BRISTOL—The Wallace Barnes Company has announced an extensive building program. At the mill plant in Forestville, a 12 bay addition giving 16,000 additional square feet will be built and at the main plant on Main Street an addition of 8,000 square feet will be erected. Larger additions will be made at the Wallace Street or "East" plant, consisting of about 200,000 square feet. The additions will add about 50 per cent to the present floor space. The company makes screw machine products and household hardware.

President Alexander Harper of the **Bristol Brass Corporation** has denied the rumor that the company will enter the merger recently formed by the **American Smelting and Refining Company** of the Rome Brass, Taunton-New Bedford, Michigan Brass and Copper and others.

MERIDEN—It is reported that the **International Silver Company** is planning to centralize the manufacture of sterling silver at its Wallingford factory necessitating the removal of Factories W and S from this city soon. This will be followed by the expansion of the concern's cutlery manufacturing now located in Factories H and K, which will take over the vacant factories.

Every manufacturing concern in the city has written the Board of Education urging that a trade school be established here, so that boys in the high school who do not expect to go to college may have an opportunity to get some training that will fit them for better jobs in the factories than they would otherwise have.

WINSTED—The directors of the **Strand and Sweet Manufacturing Company,** wire manufacturers, have declared the semi-annual dividend of four per cent on the company's stock.

The Winsted Insulated Wire Company is unusually busy at present and is now operating 24 hours a day, seven days a week.

UNIONVILLE—Hubert C. Hart, president, treasurer and general manager of the **H. C. Hart Manufacturing Company,** cutlery and specialty manufacturers, plans to retire soon and will be succeeded by his son, **Edison W. Hart.**

SOUTHINGTON—The factory of the **H. D. Smith Company** will be opened in a short time. The concern has been in bankruptcy for some time, but **Grover Lassen,** one of the principal stockholders, has agreed to pay all money owed. The concern is one of the oldest drop forging companies in the country and manufactures several lines of hand tools. The bankruptcy court has indicated that it will discharge the receivers if Mr. Lassen pays the claims and reopens the factory.

THOMASTON—Earl DeBisschop has been appointed assistant superintendent of the marine department of the **Seth Thomas Clock Company.** —W. R. B.

Middle Atlantic States

Rome, N. Y.

January 2, 1929.

Expansion of business in the large metal working industries in this city is confidently predicted as the new year opens.

A new impetus has been given the local industries by the organization last month of the **Republic Brass Corporation,** combining two local concerns, the **Rome Brass and Copper Company** and the **Rome Manufacturing Company,** with the **Taunton-New Bedford Copper,** of New Bedford, Mass., the **Baltimore Sheet Metal Company,** the **Michigan Brass and Copper Company** and the **Dallas Brass and Copper Company.**

This merger, which was in the making for some months, brings to Rome the main offices of the corporation. **Barton Haselton**, who has been the directing genius of the Rome Brass and Copper Company and allied industries since the death of his father in 1908, is head of the new organization. The Rome plants have generally been busy throughout the past year. There has been some part-time employment in certain departments, but no more than in normal years. With the approach of Autumn, business speeded up and at the beginning of the new year it is nearing its peak.

Orders that will keep all branches of the metal industry busy have been booked for the first quarter of 1929 and there is an increase in orders for both domestic and export trade. South America has entered the local market with increasing demands.

The prospect for the year is as good as, if not better than, 1928, which was one of the most satisfactory of post-war years. R. C. M.

Newark, N. J.

January 2, 1929.

Foote, Pierson and Company, Inc., New York City, have purchased the industrial building at 73-77 Hudson Street, Newark, for the purpose of manufacturing electrical instruments. The business was started in New York City. The firm is moving to Newark because more satisfactory manufacturing facilities were found there and because most of the officers of the company live in New Jersey.

Following Newark concerns have been chartered: **Industrial Lacquer Corporation**; $10,000 preferred and 150 shares common no par; manufacture chemical products. **Sanitary Public Service Corporation**; 35 shares no par; manufacture sanitary devices. **Locco Company**, 1,000 shares no par, manufacture household appliances. —C. A. L.

Trenton, N. J.

January 2, 1929.

Business conditions have varied during the past twelve months. At times plants would report operating under normal conditions and a short time later would find business bad. Some manufacturers believe a presidential year always has a bad effect on money matters. Now that the election has been settled, better times are looked for.

The Trenton Smelting and Refining Company announces a reduction in capital stock. The total amount of previously authorized capital stock is $100,000. The total number of shares issued was 1,000, of $100 par value each. The capital stock is now reduced to $10,000. The concern is controlled by the **Amalgamated Securities Company.**

The Hobson Flatware Company, of Pennsylvania, is erecting a new plant at Lambertville, N. J., where it will manufacture nickel plated knives, forks and spoons for the 5 and 10 cent stores. The new plant will cost $100,000 and will employ about 250 hands.

The Graybar Electric Company has opened a new establishment at 223 East Front Street. **L. O. Crocker**, who has been in the electrical supply business for many years, is at the head of the concern.

The Rhodia Chemical Company, Jersey Avenue, New Brunswick, N. J., has begun to expand its plant to take care of anticipated increase in business in 1929.

The following concerns have been chartered here: **Diamond Chemical Corporation,** Bloomfield, N. J., chemicals; 2,500 shares no par. **George Signal Company,** Summit, N. J., manufacture electrical signals, $100,000. **New Jersey Lathers, Inc.**, Jersey City, manufacture wire and metal lathing, 100 shares no par. **Leonard J. Beck, Inc.,** Jersey City, steel and brass, 1,000 shares no par. **Mulsaphalt Company, Inc.,** Jersey City, manufacture chemicals, $100,000. —C. A. L.

Middle Western States

Detroit, Mich.

January 2, 1929.

The non-ferrous metal industry by and large has experienced a fairly good year. Certain lines, of course, have not kept up the desired pace, but when the industry is compared with others it is gratifying to find that conditions might have been much worse. For many years Detroit has been progressing rapidly, not only in the foundry but in many other lines connected with this industry. The past year, while it may not in every respect have been as good as was expected, nevertheless has made a remarkable showing. The greatest activity, of course, is shown in the plants that manufacture motor car parts. There has been a constant demand for brass, copper, aluminum and other metals. In fact, it was far better than the year before, and what is still more gratifying is that it looks as if the new year would exceed by far the production of 1928. Manufacturers are entering the new year decidedly optimistic. There is every indication of twelve months of excellent business ahead.

The manufacture of accessories during the coming year very likely will exceed that of 1928, as all motor car executives are planning decidedly increased production schedules.

The manufacture of plumbers' supplies apparently will hold its own and possibly will exceed the business record of 1928. Plating plants have had a good business throughout most of the year. Their prospects for 1929 are fully as good as they were during the year that is just coming to a close.

The Kuhnle-Winslow Company has been incorporated at Grand Haven, Mich., for the manufacture of plumbers' brass goods. The capital stock is $20,000. The owners are Frederick C. Kuhnle and Jessie M. Kuhnle, Chicago; and Arthur D. Winslow, Wilmette, Ill.

Fire which apparently was started by an explosion caused a loss of about $75,000 at the plant of the **Campbell-Wyant-Cannon Foundry Company** at Muskegon Heights, Mich., on the night of December 1. No one was injured.

The Wolverine Enameling Company, Detroit, has added to its activities a division for the manufacture of a building product known as "Weco-Tile," to be used in walls of kitchens and bathrooms. Development of this tile is the result of contact with the trade in many lacquering and enameling problems. It is expected that additions to the plant will have to be made in the near future in order to meet the requirements of a steady increasing clientele.

Gross sales of the **Kalamazoo Stove Company,** Kalamazoo, Mich., for the 11-month period ending November 30, as reported by **A. L. Blakeslee,** president, amounted to $3,529,717. This is an increase of 12.5% over the same period of 1927.

Ira A. Wyant, secretary-treasurer of the **Campbell-Wyant and Cannon Foundry Company,** at Muskegon Heights, Mich., has been elected vice-president of the **West Michigan Consumers Company.**

The Bohn Aluminum and Brass Corporation has booked advanced business indicating a substantial increase in sales and earnings for 1929. One contract which totals $16,000,000 has been booked with a leading manufacturer, it is announced. Another contract has been closed for a total of $1,000,000 covering aluminum parts for radios. An appreciable swelling in the corporations export business also is promised, a large order having been placed by a European manufacturer.

The Defender Manufacturing Company, Allegan, Mich., has voted to double the capacity of its plant, which makes automobile bumpers. New capital to the amount of $50,000 also has been voted.

Charles H. Royer, of the **McCord Manufacturing Company,** was recently elected temporary chairman of a group of manufacturers which will organize an employment and safety managers' club to put through a real safety program for plants along the down-river district of Detroit.

Directors of the **American Smelting and Refining Company,** it is announced, have ratified the sale of the **Michigan Copper and Brass Company** to the **Republic Brass Corporation,** a new concern formed under the laws of Maryland to act as a holding company for the new brass merger in which will be the **Rome Brass and Copper Company** and other companies.

The death of **James Harvey** during the month came as a shock to many persons identified in the copper and brass industry. He was 78 years old and had been active in the industry for a great many years.

This week the last wires were strung for the great 19-inch

cables that are to support the longest span in the world, the **Ambassador Bridge** at Detroit, which connects the United States with Canada. Immediately after the wires were in place, work was commenced on compacting the cables with hydraulic tongs and placing the heavy bands over which will pass the suspended cables to support the 1850-foot main span. This new bridge, it is expected, will be ready for use about July 1, 1929, one year before the schedule time.

Twenty airplane manufacturers have applied for space for 43 planes in the **All-American Show** which will open in Convention Hall here on April 6, according to **Edward S. Evans,** chairman of the committee in charge of the show.

Announcement is made in Detroit of the purchase of the machinery and good will of **Ireland and Matthews,** one of Detroit's oldest metal working organizations, by the **Auto-pulse Corporation,** a new organization with a capital of $200,000, which is headed by **P. A. Kempt.** The new organization is manufacturing a fuel pump. Its products are used by many of the largest motor manufacturers.

William Roberts, chairman of the **Copeland Products, Inc.,** Detroit, manufacturer of refrigeration units, has been elected president of the **Allied Motor Industries, Inc.,** which recently purchased the business and principal assets of the **Elgin Clock Company,** Elgin, Ill., manufacturers of automobile equipment. A new subsidiary known as the **Van Sicklen Corporation** has been formed to take over the operation of the Elgin plant, it is stated. This company will continue the manufacture and sale of vanity and smoker sets for use in motor cars, and will act as exclusive distributor in the automobile industry for the **Illinois Watch Case Company** and its subsidiary, the **Elgin American Manufacturing Company,** which are among the largest producers of watch cases, vanity cases and cigarette cases.

It has also reached an agreement with the **Haskelite Manufacturing Company,** Grand Rapids, it is stated, for the use of Haskelite bas-relief and sales rights for such of these decorative products as now apply to the automotive industry. In the past the **Elgin Clock Company** has confined its business to the production and sale of vanity and smoker sets and the distribution of automobile clocks. It has been doing more than 80 per cent of this business in the automotive field, it is stated.

—F. J. H.

Toledo, Ohio

January 2, 1929.

This city comes to the close of the year with favorable reports from a manufacturing standpoint, particularly so far as the brass, copper, aluminum plating industries are concerned.

The plating plants have been busy practically all the year. Many of these plants are attached to concerns engaged in various lines of manufacture. For this reason plating in Toledo almost always makes a good showing, since it does not depend entirely on one line. The new year is approached with confidence of even better business than in the period just closing.

Of course, nearly every one knows, the non-ferrous metal industry in Toledo as well as in other manufacturing centers along the Great Lakes, depends to a great extent on the motor car industry. So long as the latter continues active there sure is to be plenty of demand for brass, copper and aluminum products. Toledo has had a successful year, not only in this field, but in many others as well. Although December shows some decline in manufacturing, due principally to taking of inventories, much activity is expected at the beginning of the new year. Toledo manufacturers in the non-ferrous field are facing one of the best periods in history.

The **Willys-Overland Company,** motor car manufacturers, like others in that same industry, has experienced an active year, so much so, in fact, that the organization has declared an extra stock dividend of five percent on the common stock in addition to the regular quarterly dividend of 30 per cent per share, both payable on February 1, to common shareholders of record of January 18, 1929.

The **Electric Auto Lite Company,** Toledo, it is announced, has obtained control of the **Columbus Auto Parts Company,** Columbus, Ohio. No changes will be made in the personnel of the Columbus organization, it is stated.

—F. J. H.

Cleveland, Ohio

January 2, 1929.

The brass, copper and aluminum plants in this area have enjoyed a successful year and show great optimism for 1929. The automotive parts and other accessory plants have just enjoyed the greatest fourth quarter the industry has ever had. In October, suppliers of original equipment to the motor vehicle makers and makers of replacement parts and garage equipment for the trade, did virtually the same heavy volume of business that they did in September, and during the first half of December maintained operations only a little below the October level.

The pendulum of the automobile industry, which uses as much non-ferrous metal as any other industry is again swinging toward Cleveland, and it is expected 1929 will witness much progress here along this line.

Plating plants have had a good year and the outlook for 1929 in this field will equal, if not exceed, the record for the year just coming to a close.

One of the important events in the last few months is the confirmation of the stock merger of the **Chandler-Cleveland Motors Company** of Cleveland with the **Hupp Motor Car Corporation** of Detroit. With such changes as this there are evidences that Cleveland's automotive industries in 1929 will have the greatest year in their history. An indication of Cleveland's industrial progress during the year is the fact that at the present time fewer people are out of employment than a year ago or even two years ago.

The greatest variety of accessory exhibits in the history of the Cleveland Automobile Show will be presented in the 1929 exhibition scheduled for January 26 to February 2.

A survey conducted recently by a directory company in Cleveland shows that Chicago, so far as foundries are concerned, is the leading city with 183, and is followed by Cleveland with 121. Detroit, with 100 foundries, ranks third, Grand Rapids, Mich., with 26 ranks thirty-first.

The Chase Brass and Copper Company is among the establishments that have decided to locate in the Euclid village area. It will be on the Babbitt road, between the New York Central and the Nickel Plate railroads.

Twenty-eight years ago the first Peerless "horseless carriage" was built in a little shop in Cleveland. **A. F. Misch,** still with the **Peerless Motor Car Corporation** as vice president in charge of production, built the crude engine that propelled it. From that little shop has grown the present huge plant. Reorganization of the plant to eliminate unnecessary handling of materials has of late been a major item in the company's program. All this has been accomplished and now this great plant is among the first of its kind to operate with absolute time saving and labor saving production methods.

The Cleveland Armature Works has been incorporated. The capital stock is $100,000. Owners are Frank M. Gentsch, Reul A. Lang and Frank F. Gentsch.

—F. J. H.

Chicago, Ill.

January 2, 1929.

The metal industry in Illinois has enjoyed a successful year, and abundant prosperity for the state during 1929 has been forecast by leading Illinois bankers. With this promising outlook, the metal trades enter 1929 with optimism, satisfied that better conditions are in store. Manufacturing establishments in Chicago and Illinois are operating at 75 to 80 per cent of capacity, while a number of factories are reported operating full.

A number of Chicago metal plants have erected additions and expanded during the past year. At the **Zouri Drawn Metals** plant two additions are under way. One of the improvements is for the use of the office force and the other for the plant. The total cost of erecting these two additions is placed at $14,300.

Mergers have taken place in metal as well as other lines of business during the past year. The directors of the **Dallas Brass and Copper Company,** Chicago, recently approved a plan to merge with five other non-ferrous metal companies. These companies will all operate as divisions of the **Republican Brass Corporation.** The Dallas company operates the only

non-ferrous rolling mills in the Chicago district. The completion of a new wing, adding substantially to present plant capacity, has been announced by the directors of the company.

One hundred employes, fifty of them women, of three commercial houses fled a fire in the business district of Chicago which severely damaged the **Paltridge Metal Company,** one of the occupants of the building. The damage was estimated at $75,000 and $100,000 and the two story structure was almost a total loss.

Fire also did damage estimated at $175,000 to a building occupied by the **I. H. Wells Foundry Company** and another concern at 2020 North Major Avenue. Low water pressure forced the fire departmnt to use hand chemical extinguishers.

The Hero Furnace Company has increased its stock from $300,000 to $350,000 and changed its location to 1801 Pleasant Street, DeKalb, Ill. The concern has changed its name to the **Standard Foundry and Furnace Company.**

The Hopwood Retaining Corporation is a new Illinois corporation with a capital of $150,000. Signers of the articles of incorporation of the new firm are **E. C. Camp, Bertha Hopwood** and **J. A. Hopwood.**

The Midland Metal Company has increased its stock from $250,000 to $500,000. —A. P. N.

Wisconsin Notes

January 2, 1929.

Metal industries have enjoyed good business in Milwaukee, as well as throughout the state, during the past year. Milwaukee has gained 44 industries and 2,500 employes, the greatest gain in new industries being made by the metal trades. New metal companies started in Milwaukee during the past year include the **Badger Brass Foundry Company,** manufacturers of bronze brass castings, which was started in February, 1927; the **Midwest Die Casting Company;** the **Milwaukee Lead Works;** and the **Special Stamping and Manufacturing Company,** makers of metal stampings. All these concerns have enjoyed good business during their first year.

Throughout the state the metal trades have been busy. Wisconsin gradually has been nearing the top in the manufacture of aluminum products and has 16 plants engaged in this work. The state now ranks second in the country, with Ohio ranking first. One of the largest manufacturers of aluminum cooking utensils in the United States is the **Aluminum Goods Manufacturing Company,** of Manitowoc, Wis. This company recently declared a quarterly common dividend of 30 cents per share, and split up its stock ten for one. Recently a block of 200,000 shares was offered publicly. This was the first time outside investors were given an opportunity to obtain an interest in the corporation. Earnings in the first nine months of this year amounted to $1,445,405. Profits for the full year are expected to exceed $1,750,000. Additional facilities are being constructed at the Manitowoc plant which will cost $700,000 and which are scheduled to be completed in September, 1929, according to **George Vits,** president.

Other metal industries of the state are working at capacity and expect to continue to operate steadily throughout 1929.

The Nekoosa Motor and Machine Company, at Nekoosa, Wis., is erecting a concrete and steel structure adjoining their present plant which will house the brass foundry. **M. J. Power** is president of the concern.

—A. P. N.

Other Countries

Birmingham, England

December 23, 1928.

The jewelry trade has had a fairly busy time during the last few weeks in preparation for Christmas buying, but the rush has not been as marked as in times of good trade. The jeweler is apt to blame the public for spending money in other directions, such as wireless and motor cars, and the craze for cheap imitation ware has done a good deal towards keeping the firms making the real thing short of work. To some extent the fashion of wearing jewels is returning, but the King's illness has helped to reduce business within the past few weeks.

Business in the brass trade continues variable, but foundries and rolling mills have been doing rather better on the export side. In such things as art brass, Australia and New Zealand have been among the principal buyers. The depression, however, in the basic industries reacts upon the trade. Although a good deal of shipbuilding has been placed recently, this has not had time to filter through to allied trades, but the revival of activity brings with it the possibility of ship-fittings being required.

The report of the **London Tin Syndicate, Ltd.,** for the year ended September 30 shows a gross profit amounting to £202,653 against £146,729 for the previous year. The balance available is £220,432 against £140,474.

A. J. G. Smout, a well known Birmingham metallurgist, recently gave a lecture in Birmingham on "The Story of Copper." Among other things, he said that the balance of copper production is now moving away from the United States to some extent, as the British Empire, mainly in Canada and Rhodesia, has large supplies of ore which are rapidly being developed, and it might be expected that in the near future the British Empire will be able to obtain all its copper from within its own domain.

The process by which precious metals are recovered from jewelers' waste, etc., was described by **E. A. Smith,** of the **Sheffield Smelting Company,** in a lecture to the Birmingham Jewelers and Silversmiths Association. Mr. Smith pointed out that the recovery of waste of gold, silver, platinum, etc., was equally the concern of the workman as of the manufacturer, and it was only by the sympathetic co-operation of both the interested parties that the most satisfactory results could be obtained and economies in production effected.

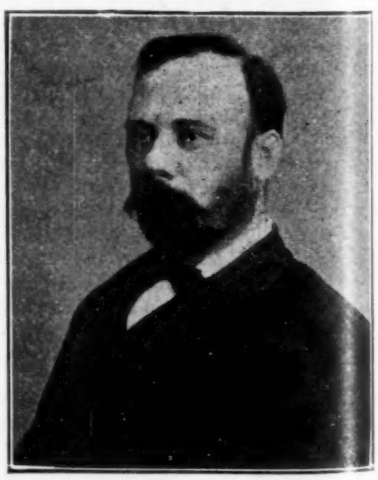
The non-ferrous metal trades of Birmingham continue on the quiet side, but the advances in spelter have led to rather more buying of this metal. The copper tube makers are depending mainly upon orders in hand as new business comes in slowly. The electrical and wireless trades are responsible for a good deal of activity in copper sections, etc. Some of the wireless manufacturers are having an exceptionally busy time and absorb good quantities of copper terminals and screws.

—J. H.

Joseph Horton

Joseph Horton, of Birmingham, England, British correspondent of The Metal Industry and a frequent contributor to its columns, died on November 30, 1928, after a year's illness. Mr. Horton was 68 years of age. He was born at Wednesbury, England, a center of the British iron and steel industry. His father was engaged in steel work and before becoming a journalist Mr. Horton also entered a steel mill for a time. However, he displayed an aptitude for writing early in life, and at 28 became editor of the "Labor Tribune," a periodical for iron workers and miners. Later he was associated with a Birmingham journal. In 1902 he became a free-lance journalist, specializing in the iron, steel and metal trades. In this pursuit he was highly successful, and after some years he took a partner and established the firm of Horton and Garbutt, which provides British news and technical articles for a number of periodicals abroad as well as in Britain.

By the death of Mr. Horton, British industry as well as readers in several countries have lost an able reporter and author.



JOSEPH HORTON

Business Items—Verified

The **New Jersey Lacquer Manufacturing Company** has moved into its new plant at 920 Dell avenue, North Bergen, N. J.

L. G. Balfour Company, Attleboro, Mass., manufacturing jewelers, have opened Southwestern offices at Dallas, Texas, in charge of John R. Jones, district manager.

Ohio Foundry Company, 9608 Quincy avenue, Cleveland, Ohio, has completed building and is operating its new enameling plant containing 30,000 square feet of floor space.

Willias Gold Refining Company, 2978 Main street, Buffalo, N. Y., has purchased the 2-story National Grinding Wheel Company plant on the adjoining site and will use this for expansion.

Federal-Mogul Corporation, Detroit, Mich., manufacturers of metal bearings, babbitt metal, castings, etc., is building an addition of approximately 25,000 square feet to its machine shops, at a cost of about $70,000 with equipment.

Donald LeStage has purchased an interest in **Sturtevant & Whiting,** North Attleboro, Mass., jewelry manufacturers. Mr. LeStage is interested also in the **LeStage Manufacturing Company** and the **O. M. Draper Company,** jewelry concerns.

Botfield Refractories Company, Philadelphia, Pa., manufacturers of fire brick cement, announces that McCarthy-Jones and Allen Company, Inc., 111 First avenue South, Nashville, Tenn., has been appointed distributor of Botfield products.

Aluminum Goods Manufacturing Company, a large interest in which is held by the **Aluminum Company of America,** plans the sale of 200,000 shares of its stock, the proceeds to be used for plant extensions and general corporate purposes.

The **Canadian Department of National Revenue,** Ottawa, Canada, has issued a set of rules governing the importation of goods into the Dominion. This is contained in Circular No. 666-C, which may be obtained from the department named.

General **Cable Corporation** announces that on December 17, 1928, the name of its Baltimore branch was changed from Baltimore Copper Mills to **Safety Cable Company (Baltimore Branch),** by which name that division will henceforth be addressed.

P. J. Flaherty, president of **Johnson Bronze Company,** New Castle, Pa., announces the plant will be greatly enlarged at once. Contracts have already been let for large additions to the foundry and work has been started. The additions will be completed in early Spring.

Meta-Mold Aluminum Company, Milwaukee, Wis., has removed from 129 East Michigan street to its new plant at 57th avenue and Burnham street. The firm states that it now has increased facilities for the manufacture of aluminum alloy castings in permanent, semi-permanent and sand molds.

Midwest Chandelier Company, 1403 Chestnut street, North Kansas City, Mo., is building a new one-story and basement plant, 115 x 135 feet, to cost $75,000 with equipment. The company has a brass, bronze and aluminum foundry, casting and spinning shops, plating, polishing and lacquering departments.

Peter **Healey Brass Foundry Company,** Evansville, Ind., has filed papers of preliminary dissolution. The company states that no change will be made in products or management, however. The firm will continue to operate but corporation will be dissolved. It operates a brass foundry exclusively.

Kast **Copper & Sheet Iron Company,** 91 Main street, Buffalo, N. Y., suffered slight damage to its plant on November 6, 1928, when fire destroyed about two blocks of industrial property nearby. The company's head, **N. Kast,** reports that the rapid action of the plant's employees saved the building from destruction.

Samuels Stamping and Enameling Company, Chattanooga, Tenn., is installing a large continuous enameling furnace which will handle greatly increased production. This is the first porcelain enameling furnace installation for the South and furnace is being installed by The Ferro Enamel Supply Company, Cleveland, Ohio.

Baltimore Tube Company, Inc., announces that a district office has been opened at Philadelphia, Pa., at Room 906, Liberty Trust Building, for the sale of fabricated copper and brass products. The company is represented by **B. F. Brusstar,** district sales manager, the former representative having been **William L. Hoffman.**

National Grinding Wheel Company, Buffalo, N. Y., has work in progress on a new plant at North Tonawanda, N. Y. This plant will cost about $50,000 and will provide for increased production. The company will remove to the new plant when it is finished, having sold its Buffalo works to the Williams Gold Refining Company.

Since December 19, 1928, the New York office of **The Brown Instrument Company** has been located at Room 1502 Roebling Building, 117 Liberty Street, New York City, removing from 50 Church Street. This change was made necessary by the need of larger quarters to provide for the increased staff now attached to this district office.

Evaco Industries, Detroit, Mich., headed by **E. V. Allen,** president of the Detroit branch of the American Electroplaters' Society, announces that due to increased demand for chromium plate, the company has been compelled to add 1,700 square feet of space and new equipment, which has more than tripled the firm's capacity.

The Ajax Metal Company, 46 Richmond street, Philadelphia, Pa., is enlarging its electric furnace manufacturing department by the addition of a 2-story, 52 x 56 ft. building at 1108 Frankford avenue. The company states that this has been necessitated by the constantly increasing demand for the Ajax-Wyatt induction furnace, which it produces.

Thomas Savill's Sons, Inc., Philadelphia, Pa., makers of brass goods for water, steam and gas, plumbers' supplies, etc., have installed and are operating a chromium plating department, for finishing plumbing fixtures for themselves and for other manufacturers desiring chromium plating service. The firm is located at Hancock and Huntingdon streets.

Wheeler Radiator Manufacturing Company, 1637 Collamer Road, Cleveland, Ohio, is enlarging its plant by the extension of its offices and manufacturing departments. A new chromium plating installation is to be made, with suitable polishing equipment. The company has plating, polishing, brazing, casting, stamping, zincing, tinning and soldering departments.

Nicholl Chromium Company, Inc., 3704 Mack avenue, Detroit, Mich., has been organized as a chromium plating concern, to operate under the patents of the **United Chromium Corporation.** The new company will do work on tools, dies, bearings, etc. Both job work and contracts will be handled. The officers are: Victor J. Nicholl; president; P. P. Hale, vice-president; J. A. Nicholl, secretary.

M. C. Wright Company, Worcester, Mass., producing vacuum cleaners, has been reorganized under management of Dwight C. Daniels, formerly production manager of the machine division of the Norton Company, Worcester. The officers are: Henry H. Wright, president; E. Stanley Wright, treasurer; Clifford L. Wright, secretary; and Clayton M. Wright, vice-president and assistant treasurer.

Whiskette Manufacturing Company, Terre Hill, Pa., is completing and will soon place in operation a plant for the manufacturing of buffing wheels made of steel wool for metal polishing and scratch-brushing operations, rotary brushes for abrading wood and metals, and a small steel wool brush suitable for use by housewives in place of plain steel wool. The latter is designed to protect the hands from splinters.

The Hisey-Wolf Machine Company, Cincinnati, O., manufacturers of electric drills, grinders and buffers, has opened an office at 210 Machinery Hall, 549 West Washington Boulevard, Chicago, Ill., which will be in charge of **Roy D. Haworth,** direct representative of the company. He will cooperate with the dealer and jobber trade. The company states that it plans to establish new offices in principal cities in order to render prompt and efficient service to its customers.

Chromium Engineering Corporation, New York City, has removed its executive offices from 246 Fifth Avenue to its plant building, 132 West 22nd Street, New York City. The company states that it is operating a model chromium plating plant, where work is being done for customers awaiting chromium installations at their own plants. There are facilities for quantity production of chromium plate bearing a two-year guarantee against rust, corrosion, cracking, peeling or

stripping, it is stated, a label to that effect being attached to each article plated.

Ruemelin Manufacturing Company, manufacturers of sand blast and dust suppression equipment, will remove to 588-98 Clinton street, Milwaukee, Wis., the new address to become effective February 1, 1929. The company has hitherto been at Minneapolis, Minn. It is stated that the greatly increased volume of business has necessitated considerably enlarged manufacturing facilities and a more central location. The removal to Milwaukee will provide for these, permitting easier and quicker contact with the trade.

The Magnetic Manufacturing Company, Milwaukee, Wisconsin, manufacturers of the high duty magnetic separators, magnetic clutches and special magnetic equipment, announces that effective January 1, 1929, its products will bear the trade name "Stearns" in addition to the former trade name "High Duty." This action was prompted by the need for a more specific identification of its products as compared to the general term "High Duty" used in the past. The new designation is derived from the names of company officers, **R. H. Stearns,** president and treasurer and **R. N. Stearns,** secretary.

Crown Rheostat and Supply Company, 1910 Maypole avenue, Chicago, Ill., manufacturers of plating and polishing apparatus and materials, electrical appliances for plating rooms, chemicals, etc., have increased their capital stock to $200,000 and added some new men to the organization, according to an announcement by **S. E. Huenerfauth,** president. The other officers, including new appointees, are: **C. E. Huenerfauth,** vice-president; **H. E. Willmore,** secretary; **R. C. Trees,** treasurer; **G. A. Spencer,** general manager; **L. K. Lindahl,** sales manager; **W. G. Meggers,** assistant sales manager. The company states it has enjoyed a prosperous year and indications are that 1929 will be even better.

The Rud. Mueller Manufacturing Company, Chicago, Ill., is now operating its new chromium plating plant which was recently installed and is considered one of the best equipped plating plants in the city of Chicago. The company for the past eighteen years devoted itself to the manufacture of carbonators, and soda fountain parts, and is now contemplating chromium plating all parts which were formerly silver plated. Four years ago, Rudolph Mueller, president of this company, experimented and promoted the idea of using chromium plate on soda fountain parts, it is stated, and the demand from the soda fountain manufacturers at the present time indicates that Mr. Mueller's ideas were correct.

Wellman Bronze Company and **Ideal Bronze Company,** both of Cleveland, Ohio, have arranged for a merger of their interests. Headquarters are to be at the present Wellman offices, 6017 Superior avenue, Northeast. The combined annual capacity of these two firms is said to be about 2,000,000 pounds of bronze and aluminum castings, and the consolidation is expected to make for an increase in business and reduced expenses. The Wellman firm was incorporated in 1910. In 1926 it acquired the **City Brass Foundry Company** and the **Cleveland Flushmeter Company.** The new merger will be headed by **Fred S. Wellman,** president and treasurer. **F. H. Zwilling** headed the Ideal Bronze Company, which is located at 1265 East 55th street, Cleveland.

Review of the Wrought Metal Business

By J. J. WHITEHEAD,

President, Whitehead Metal Products Company of New York, Inc.

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

January 2, 1929.

To restate the fact that the year just closed has been the most prosperous that the brass and copper industry has ever seen in peace times and that production and sales records for all time have been broken seems but a repetition of what every one knows to be true in greater or less degree of practically every industry in the country. However when it is recalled that for many years following the war the productive capacity in the brass and copper industry has been greatly in excess of the consumptive demand there is an added significance given to the fact that all of the mills producing brass and copper sheet, rod, tube and wire ended the year with a record-breaking volume of orders on their books and every department working at full capacity. A large part of the explanation lies in the fact that through educational advertising the public has been made to realize that for permanency and utility and therefore economy, copper, nickel, zinc and their alloys are the most satisfactory and cheapest metals when considered in the light of service rendered.

Copper for roofing and brass pipe for plumbing were formerly used in a somewhat limited way only on the major buildings in the larger cities. Gradually the public came to demand these products in the better class of houses and next the speculative builders in the more active suburban developments of large Eastern cities came to see the advantages of brass and copper equipment until today prospective buyers for almost all classes of homes demand copper flashing and leaders and gutters and brass pipe.

The public having become actively interested in the campaign against rust have now begun to call for copper water heaters and hot water storage tanks to replace the galvanized iron types which rust out or throw up rusty water after a year or two of use, and manufacturers are putting out a line of these boilers at reasonable prices to meet this demand.

This public response to the educational campaign as to brass and copper came first from the larger and wealthier cities on the Atlantic seaboard, but during the past year it has come to be felt very noticeably in the interior, especially in the larger cities of the middle West, and it is now spreading rapidly. With a reasonable degree of prosperity in general business conditions which will permit building operations to continue at the present rate, it would appear that from the further expansion of the use of brass and copper in the new homes there will be enough of these materials required to keep the present productive capacity running comfortably.

These new requirements added to the needs of other industries such as the Automobile, Radio, Refrigeration and Electrical developments are what have swamped manufacturers in this line with business in increasing volume during the past year. The outlook points to a further expansion in all these lines for the year to come.

The market for Monel metal and nickel has developed during the year to a point far beyond the expectation of the producers and the order book conditions at the year's end are much the same as in the brass and copper industry. All records for production and sales have been broken during the year.

The amount of Monel metal used in the hotel, restaurant and refrigeration fields has run into enormous tonnages, as have also the requirements for the metal in the textile, dyeing and chemical industries. During the year a number of installations of Monel metal for household appliances marked the beginning of a campaign for the development of the business along these lines.

Some manufacturers of kitchen tables and kitchen cabinets for homes have trimmed their products with Monel metal and the largest manufacturer of electric kitchen ranges has standardized on Monel metal ovens in his products, avoiding the complaints heretofore common because of rusty ovens.

A national campaign consisting of full page advertisements in the "Saturday Evening Post" and "Good Housekeeping" has just started featuring Monel metal in the home, in which many products using the metal will be given widespread publicity and new uses suggested. A national competition with $2000 in prizes is to start in January under the auspices of the Art Alliance of America for the best designs of kitchen sinks to be made of Monel metal and already some large metal fabricating concerns are preparing to take up the production of the product, in a large way.

It has been demonstrated that with the higher standards of living that have been established there has come a desire on the

part of the public for a better and more lasting quality of materials in home construction and equipment. The producers of copper, brass, Monel metal and affiliated alloys have made great strides in their efforts to capture the markets thus opened to them and a large amount of their prosperity is due to the success which has attended these efforts to increase the consumption. There is still an enormous potential outlet for the metals in that direction however and additional effort is being applied to extend their use and continue the present prosperous conditions into the New Year.

Metal Market Review

By R. J. HOUSTON,
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WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

Copper

January 2, 1929.

Movement of copper into consumption in 1928 was on a gigantic scale. The fact of the matter is that demand has been running well ahead of production and has set a new high record for the year. The high rate of activity in the consuming industries at home and abroad has been of unprecedented magnitude. Producing operations at mines and refineries were also at a greater rate of output and efficiency than ever before. This was absolutely necessary, however, to fully satisfy the voracious copper appetite that has developed the world over.

At the beginning of 1928 the market opened at 14c to 14⅛c on basis of Connecticut delivery. A remarkably steady tone prevailed at this level until at the end of March when there was an advance to 14¼c for domestic shipment and 14½c c.i.f. European ports. During the first quarter there were a few sales of outside holdings at 13⅞c and that figure marked the extreme low price of the year. A tremendous rush of orders poured into the market in the month of May. The pressure of demand came from both home and foreign consumers, and prices advanced ½ cent a pound on all positions, with quotations at the end of May of 14¾c Connecticut delivery and 15c for export. These price levels were maintained with unbroken continuity until the middle of September when they were advanced to 15c and 15¼c respectively.

It is especially interesting to note that in the second half of September the upward trend of the market developed more rapidly. Heavy buying was the outstanding feature and by the end of September the market was 15¼c for domestic business and 15½c c. i. f. usual European ports. During the last half of October there were three price advances of ¼c per pound each which lifted the local quotation to 16c and that for export to 16¼c. These prices were maintained until December 26 when the domestic basis was further advanced to 16¼c. On December 27 the export price was lifted to 16½. These figures reflect the phenomenal demand for the red metal and are the highest since May, 1923.

The year-end condition of copper is unusually sound. Consumption was on an enormous scale in 1928. The 1928 peak is liable to be exceeded in 1929. Electrification plans and many other constructive major projects are scheduled for execution in the new year. The market continues to move forward vigorously and on January 2, 1929, was advanced to 16¾ cents delivered to Connecticut Valley points. Present indications point to higher prices in the near future. The outlook for copper is exceedingly bright.

Zinc

The price movement in zinc was slightly upward in 1928, but the market trend was narrow over the entire year. Prices have ruled comparatively low for the last two years, but there was a recovery to 6.70c New York and 6.35c East St. Louis in the latter part of year for Prime Western as against 6.05c and 5.95c respectively at the beginning of 1928. The market gave indications of being fairly well stabilized during the last half of the year. Demand was on a good scale, although consumers showed a disposition to follow a hand-to-mouth policy in buying. Ore prices have been steady at $40 for a number of months. Production, however, is maintained at a heavy rate. A more genuine and widely adopted curtailment plan would place the industry on a sounder foundation. Stocks in smelters' hands on December 1, 1928, were 46,542 tons as compared with 39,320 tons on December 1, 1927. At the end of 1926 they amounted to only 21,887 tons.

Tin

At the end of 1928 the tin market closed well under figures ruling at the beginning of the year. This metal is peculiarly susceptible to speculative manipulation and erratic market movements. Values are consequently subject to wide fluctuations, and prices are often either artificially inflated or forced down according to the position taken by the dominant group of operators. There is, of course, a basis of action existing for all market movements, but tin is invariably an intricate puzzle to the average consumer and trader.

The record of operations for the past year certainly shows that the course of prices registered frequent and sharp fluctuations. Recessions and rallies were conspicuous features. Tin is never a static commodity, and for that reason it attracts large-scale manipulation in the London market especially. In the fore part of the year prices were at their highest. The January high for Straits tin was 57¾ cents, and that level marked the high point for the year. A persistent weakening of values developed during the first half. During June the low point was touched when the quotation was 45¾ cents. Both the high and the low price extremes in 1928 were recorded in the first six months. Since then the market has been subject to many irregular developments.

Each successive month lately saw an increase in the world's visible supply of tin. From July 1 to December 1 the increase amounted to 5,836 tons. On December 1, 1928, the total visible supply was 22,067 gross tons as compared with 14,594 tons one year previous, being an increase of 7,473 tons. Despite this phase of development, a powerful group in London have bought up large quantities of prompt tin to hold for the present, apparently in the interest of high prices. Periods of market weakness and rallies followed one another lately. Trading was active and recent purchases by consumers were on a large scale. Production has been increasing, and the question is can demand be keyed up to meet the rising output. Dealings in Standard tin were inaugurated on the new National Metal Exchange last month. Leading tin firms are backing this enterprise and many outside interests have joined the institution. American deliveries of tin during December amounted to 7,155 tons. Total deliveries for 1928 were 78,865 tons as compared with 72,490 tons for 1927. This is a new high record and shows a heavy domestic consumption.

Lead

American consumption of lead in 1928 was at a very high rate. Prices, however, were kept on a conservative basis throughout the entire year, notwithstanding the gain in manufacturing activity. The January opening was at 6½ cents New York delivery and this price held until February 10 when there was a reduction to 6.35. There were four reductions in price during that month, the final revision bringing the selling level down to 6 cents per pound. The new low level stimulated buying on a substantial scale. On April 2 the New York price was advanced from 6c to 6.10c and continued at that level until May 25 when a further advance to 6.20c went into force. In a short time the upward trend sent the market to 6.30c for the New York position. There was a minor reaction in July, a recovery in August which gained strength enough to lift prices in September to 6.50c. There was an easing up in November which made a new adjustment necessary to 6.35c New York basis. A stronger tone developed early in December and the market went back again to 6.50c. Activity and decided strength were in evidence at year end, and on January 2, 1929, the market

advanced to 6.65c New York basis. A tone of optimism prevails both here and abroad, with high prices in both markets.

Aluminum

Heavy consumptive requirements are responsible for the remarkably strong situation in aluminum. This is an age of expanding demand for all metals, and this has kept both large and small consumers actively in the market for the different grades of this product. The larger consumers placed heavy orders during 1928, and with the automobile industry operating on tremendous schedules still greater consumption may be expected in 1929.

The price situation continued steady during the past year. No change was made by the leading producers here, and it remains at 24.30c for Alcoa mill 99% plus.

Imports of primary aluminum in 1928 were much below those in 1927. The European Aluminum Cartel is to continue the organization for a new period of three years. The Cartel comprises four large producing countries of Europe, including the principal producers of France, Great Britain, Germany and Switzerland. Last Spring they made a reduction in price of £10 per ton which brought the price down to £95 per ton.

Antimony

There were no startling developments in antimony during the past year. For a considerable time Chinese producers and dealers maintained a firm attitude. Conditions, however, weakened in the Far East and at the end of 1928 the market for Chinese regulus was quoting 9⅝c to 9¾c, duty paid, as compared with 10⅞c at the beginning of the year. Trade conditions in this metal were rather slack a good part of the time. Several parcels of spot antimony were pressed for sale recently which realized only 7½c in bond. A further quantity of prompt material came upon the market, but it was taken off the market at the latter figure. There has been a moderate demand for futures lately, and sales for March-April arrival were made at 7.70c to 7.75c c.i.f. New York. Offerings on that basis were restricted.

American consumption of regulus lately was estimated at about 800 tons per month. Recent consuming interest was fair but more active demand is needed to infuse life and strength into the situation.

Quicksilver

The market for this article fluctuated over a wide area in 1928. Domestic prices early in October advanced to $134 per flask, a record high, the war period excluded. Consuming demand failed to lend support to this level and the market soon receded to a basis of $123.50. Present price is quoted at $122 to $122.75. Italy and Spain supply the bulk of output, and the course of prices is governed largely by the attitude of European holders. Price fluctuations were between $121 and $134 per flask.

Platinum

Demand was on a fair scale for platinum, and early in the year prices were quite firm. A weaker tone developed subsequently and values at end of year were down to $69 per ounce for refined metal.

Silver

Quiet trading and narrow price movements characterized the silver market during 1928. The extreme prices for the year were a high of 63⅝ cents per ounce and a low of 56½. China and India were moderately interested, but operations were not vigorous enough to prove a prime factor for stiffer values. The market needs some fresh momentum to lift prices to a higher level as silver below 60 cents cannot be considered abreast of the times. The year closed at 57⅜ cents. United States output for the first 11 months amounted to 50,778,000 ounces.

Old Metals

Active trading and favorable developments were features in the market for old metals. This was chiefly due to the advance in new copper and the unusually heavy value of orders maintained for brass and copper grades of scrap. Export movement was also at a good rate. There was improvement in the demand for old lead as strength became more pronounced for the primary product. Dealers have taken a firm attitude and are looking for decided activity in the new year. Prices dealers are willing to pay were as follows: Crucible copper, 14 cents to 14¼ cents, light copper 12 cents to 12¼ cents, new brass clippings, 10¾ cents to 11 cents, heavy brass, 8 cents to 8¼ cents, light brass 6½ cents to 6¾ cents, heavy lead, 5 cents to 5¼ cents and aluminum clippings, 16¾ cents to 17 cents.

Daily Metal Prices for the Month of December, 1928

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	3	4	5	6	7	10	11	12	13	14	17	18
Copper c/lb. Duty Free												
Lake (Delivered)	16.125	16.125	16.125	16.125	16.125	16.125	16.125	16.125	16.125	16.125	16.125	16.125
Electrolytic (f. a. s. N. Y.)	16.125	16.125	16.125	16.125	16.125	16.125	16.125	16.125	16.125	16.125	16.125	16.125
Casting (f. o. b. N. Y.)	15.75	15.75	15.75	15.75	15.75	15.75	15.75	15.75	15.75	15.75	15.75	15.75
Zinc (f. o. b. St. L.) c/lb. Duty 1¾c/lb.												
Prime Western	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35
Brass Special	6.45	6.45	6.45	6.45	6.45	6.45	6.45	6.45	6.45	6.45	6.45	6.45
Tin (f. o. b. N. Y.) c/lb. Duty Free												
Straits	53.25	52.25	51.50	50.625	49.75	50.25	49.625	50.00	49.625	49.50	49.50	49.375
Pig 99%	[illegible]	51.50	50.75	50.125	49.25	49.75	49.00	49.25	49.00	49	49	48.875
Lead (f. o. b. St. L.) c/lb. Duty 2⅛c/lb.	6.325	6.40	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35
Aluminum c/lb. Duty 5c/lb.	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30
Nickel c/lb. Duty 3c/lb.												
Ingot	35	35	35	35	35	35	35	35	35	35	35	35
Shot	36	36	36	36	36	36	36	36	36	36	36	36
Electrolytic	37	37	37	37	37	37	37	37	37	37	37	37
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	10	10	9.875	9.875	9.625	9.625	9.625	9.75	9.75	9.75	9.75	9.75
Silver c/oz. Troy Duty Free	57.75	57.50	57.625	57.375	57.375	56.875	57.25	57.25	57	57.125	57	57.25
Platinum $/oz. Troy Duty Free	72.50	72.50	72.50	72	72	72	72	71	71	71	71	71

	19	20	21	24	25	26	27	28	31	High	Low	Aver.
Copper c/lb. Duty Free												
Lake (Delivered)	16.125	16.125	16.125	16.125	*....	16.375	16.375	16.50	16.625	16.625	16.125	16.194
Electrolytic (f. a. s. N. Y.)	16.125	16.125	16.125	16.125	*....	16.25	16.25	16.375	16.75	16.75	16.125	16.181
Casting (f. o. b. N. Y.)	15.75	15.75	15.75	15.75	*....	16.00	16.00	16.25	16.25	16.25	15.75	15.825
Zinc (f. o. b. St. L.) c/lb. Duty 1¾c/lb.												
Prime Western	6.35	6.35	6.35	6.35	*....	6.35	6.35	6.35	6.35	6.35	6.35	6.35
Brass Special	6.45	6.45	6.45	6.45	*....	6.45	6.45	6.45	6.45	6.45	6.45	6.45
Tin (f. o. b. N. Y.) c/lb. Duty Free												
Straits	[illegible]	49.50	49.375	49.75	*....	50.00	50.25	50.375	50.125	53.25	49.375	50.206
Pig 99%	[illegible]	48.875	48.875	49.	*....	49.25	49.50	49.625	49.375	52.50	48.875	49.575
Lead (f. o. b. St. L.) c/lb. Duty 2⅛c/lb.	6.35	6.35	6.35	6.35	*....	6.35	6.35	6.35	6.35	6.40	6.325	6.351
Aluminum c/lb. Duty 5c/lb.	24.30	24.30	24.30	24.30	*....	24.30	24.30	24.30	24.30	24.30	24.30	24.30
Nickel c/lb. Duty 3c/lb.												
Ingot	[illegible]	35	35	35	*....	35	35	35	35	35	35	35
Shot	[illegible]	36	36	36	*....	36	36	36	36	36	36	36
Electrolytic	[illegible]	37	37	37	*....	37	37	37	37	37	37	37
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	9.875	9.75	9.50	9.75	*....	9.50	9.50	9.75	9.75	10.00	9.50	9.738
Silver c/oz. Troy Duty Free	57.375	57.25	57.125	57.625	*....	57.50	57.50	57.375	57.375	57.75	56.875	57.325
Platinum $/oz. Troy Duty Free	71	71	71	71	*....	70	70	70	69	72.50	69	71.175

* Holiday.

Metal Prices, January 14, 1929

NEW METALS

Copper: Lake, 16.875. Electrolytic, 16.75. Casting, 16.50.
Zinc: Prime Western, 6.35. Brass Special, 6.45.
Tin: Straits, 49.00. Pig, 99%, 48.375.
Lead: 6.50. **Aluminum**, 24.30. **Antimony**, 9.50.

Nickel: Ingot, 35. Shot, 36. Elec., 35. Pellets, 40.
Quicksilver: flask, 75 lbs., $121. **Bismuth**, $1.70.
Cadmium, 95. **Cobalt**, 97%, $2.60. **Silver**, oz., Troy, 57.50.
Gold: oz., Troy, $20.67. **Platinum**, oz., Troy, $66.00.

INGOT METALS AND ALLOYS

Brass Ingots, Yellow	11⅝to13½
Brass Ingots, Red	14¾to16
Bronze Ingots	16 to20
Casting Aluminum Alloys	21 to24
Manganese Bronze Castings	24 to40
Manganese Bronze Ingots	14 to18
Manganese Bronze Forging	32 to42
Manganese Copper, 30%	25 to35
Monel Metal Shot	28
Monel Metal Blocks	28
Parsons Manganese Bronze Ingots	16½to19¾
Phosphor Bronze	16½to18½
Phospo Copper, guaranteed 15%	18½to22½
Phospo Copper, guaranteed 10%	18½to21½
Phosphor Tin, no guarantee	60 to70
Silicon Copper, 10%, according to quantity	28 to32

OLD METALS

Buying Prices		Selling Prices
13½to13¾	Heavy Cut Copper	14½to14¾
12¾to13	Copper Wire, mixed	14 to14¼
11 to11½	Light Copper	12 to12½
10½to10¾	Heavy Machine Composition	12 to12½
7¾to 8	Heavy Brass	9¼to 9½
6½to 6¾	Light Brass	8 to 8¼
7¾to 8	No. 1 Yellow Brass Turnings	9½to 9¾
9¾to10	No. 1 Composition Turnings	10¾to11
5½to 5¾	Heavy Lead	6¾to 7
3½to 3¾	Zinc Scrap	4¾to 5¼
8 to10	Scrap Aluminum Turnings	12½to14¼
13 to13½	Scrap Aluminum, cast alloyed	17½to18½
19 to20	Scrap Aluminum sheet (new)	22 to22½
35 to37	No. 1 Pewter	41½to43½
17	Old Nickel Anodes	19
17½	Old Nickel	19½

Wrought Metals and Alloys

COPPER SHEET

Mill shipment (hot rolled)	25⅝c. to 26⅝c. net base
From Stock	26⅝c. to 27⅝c. net base

BARE COPPER WIRE

18½c. to 18⅝c. net base, in carload lots.

COPPER SEAMLESS TUBING

26⅞c. to 27⅞c. net base.

SOLDERING COPPERS

300 lbs. and over in one order	24⅛c. net base
100 lbs. to 200 lbs. in one order	24⅝c. net base

ZINC SHEET

	Cents per lb.
Duty sheet, 15%	
Carload lots, standard sizes and gauges, at mill, less 8 per cent discount	9.75 net base
Casks, jobbers' price	10.25 net base
Open casks, jobbers' price	10.75 to 11.25 net base

ALUMINUM SHEET AND COIL

Aluminum sheet, 18 ga., base price, ton lots	33.30c.
Aluminum coils, 24 ga., base price, ton lots	31.00c.

ROLLED NICKEL SHEET AND ROD

Net Base Prices

Cold Drawn Rods	53c.	Cold Rolled Sheet	60c.
Hot Rolled Rods	45c.	Full Finished Sheet	52c.

BLOCK TIN SHEET

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more 10½c. over Pig Tin; 50 to 100 lbs., 15c. over; 25 to 50 lbs., 17c. over; less than 25 lbs., 25c. over.

SILVER SHEET

Rolled sterling silver 59c. to 61c. per ounce, Troy.

BRASS MATERIAL—MILL SHIPMENTS

In effect Dec. 31, 1928
To customers who buy 5,000 lbs. or more in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.21	$0.22½	$0.24½
Wire	.21½	.23	.25
Rod	.18¾	.23¼	.25¼
Brazed tubing	.29	....	.34¼
Open seam tubing	.29	....	.32½
Angles and channels	.29	....	.32½

BRASS SEAMLESS TUBING

25⅞c. to 26⅞c. net base.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod	23c. net base
Muntz or Yellow Metal Sheathing (14"x48")	21c. net base
Muntz or Yellow Rectangular sheet other Sheathing	22c. net base
Muntz or Yellow Metal Rod	19c. net base

Above are for 100 lbs. or more in one order.

NICKEL SILVER (NICKELENE)

Net Base Prices

Grade "A" Sheet Metal		Wire and Rod	
10% Quality	28¾c.	10% Quality	31¾c.
15% Quality	30¼c.	15% Quality	35½c.
18% Quality	31½c.	18% Quality	38¾c.

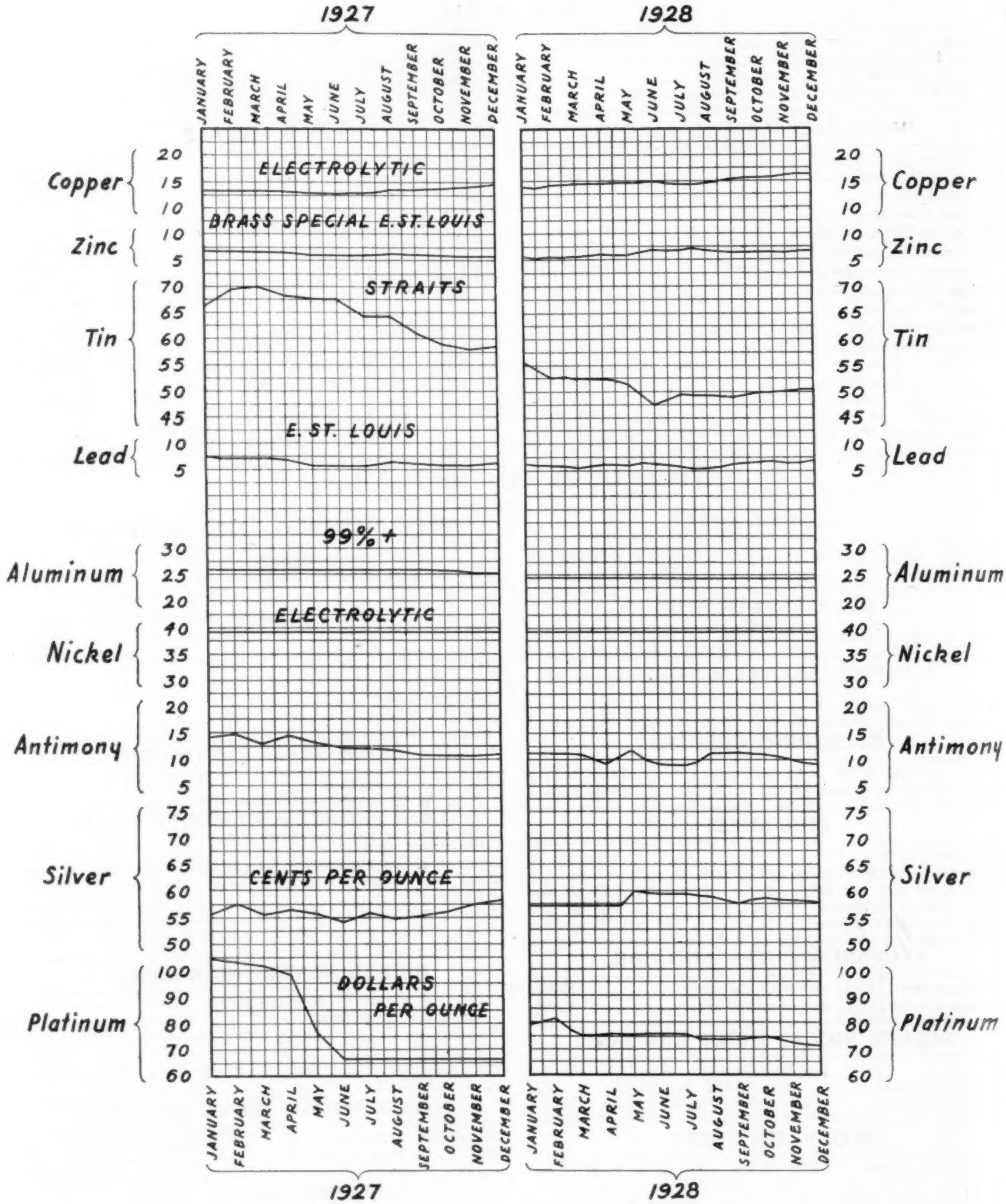
MONEL METAL, SHEET AND ROD

Hot Rolled Rods (base)	35	Full Finished Sheets (base)	42
Cold Drawn Rods (base)	40	Cold Rolled Sheets (base)	50

BRITANNIA METAL SHEET

No. 1 Britannia—18" wide or less, No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin price; 100 lbs. to 500 lbs., 10c. over; 50 to 100 lbs., 15c. over; 25 to 50 lbs., 20c. over; less than 25 lbs. 25c. over. Prices f. o. b. mill.

Chart of Metal Prices for 1927-1928



Supply Prices on Page 64

Pig Iron and Metal Products of the United States

Calendar Years 1919-1927. (1928 Estimated.)

(FROM THE UNITED STATES BUREAU OF MINES)

PRODUCTS METALLIC	1919 Quantity	1919 Value	1920 Quantity	1920 Value	1921 Quantity	1921 Value	Products
Pig iron (spot value), long tons	30,130,231	$775,915,043	35,710,227	$1,140,904,096	16,038,619	$389,437,792	Pig iron
Copper, sales value, pounds	1,286,419,329	239,274,000	1,209,061,040	222,467,000	505,586,098	65,221,000	Copper
Zinc, sales value, short tons	452,272	66,032,000	450,045	72,907,000	198,232	19,823,000	Zinc
Tin, short tons	56	73,400	22	22,000	4	2,400	Tin
Lead (ref.) sales value, short tons	424,433	44,990,000	476,849	76,296,000	398,222	35,840,000	Lead
Aluminum, pounds	*	38,558,000	*	41,375,000	*	10,906,000	Aluminum
Nickel, value at New York, short tons	511	434,485	365	293,250	111	86,000	Nickel
Quicksilver, value at S. Fran., flasks	21,415	1,933,560	13,392	1,066,807	6,339	300,595	Quicksilver
Antimonial lead, short tons (F.&D.)	13,874	1,513,968	12,535	1,963,255	10,064	870,059	Antim. Lead
Silver, commercial value, troy ounces	56,682,445	63,533,652	55,361,573	60,801,955	53,052,441	53,052,441	Silver
Gold, coining value, troy ounces	2,918,628	60,333,400	2,476,166	51,186,900	2,422,006	50,067,300	Gold
Platinum, New York City, troy oz	45,109	5,614,335	41,544	4,697,722	56,370	4,238,989	Platinum
Total value of metallic products (approximate) (b)		$1,359,744,000		$1,762,350,000		$654,130,000	

PRODUCTS METALLIC	1922 Quantity	1922 Value	1923 Quantity	1923 Value	1924 Quantity	1924 Value	Products
Pig iron (spot value), long tons	27,670,738	$608,144,858	38,361,379	$946,799,378	31,064,129	$665,078,972	Pig iron
Copper, sales value, pounds	950,285,947	128,289,000	1,434,999,962	210,945,000	1,634,249,192	214,087,000	Copper
Zinc, sales value, short tons	353,274	40,273,000	508,335	69,134,000	515,831	67,058,000	Zinc
Tin, short tons	1	912	2	1,623	7	7,028	Tin
Lead (ref.) sales value, short tons	468,746	51,562,000	543,841	76,138,000	566,407	90,625,000	Lead
Aluminum, pounds	*	13,622,000	*	28,305,000	*	37,607,000	Aluminum
Nickel, value at New York, short tons	208	133,191	100	71,605	191	114,903	Nickel
Quicksilver, value at S. Fran., flasks	6,375	368,348	7,937	521,302	10,085	692,739	Quicksilver
Antimonial lead, short tons (F.&D.)	8,075	844,993	14,190	1,950,370	20,787	3,376,713	Antim. Lead
Silver, commercial value, troy ounces	56,240,048	56,240,048	73,335,170	60,134,839	65,407,186	43,822,814	Silver
Gold, coining value, troy ounces	2,363,075	48,849,100	2,502,632	51,734,000	2,528,900	52,277,000	Gold
Platinum and allied metals, value at New York City, troy ounces	57,718	5,932,726	49,797	5,762,305	66,007	7,611,319	Platinum
Total value of metallic products (approximate) (b)		$987,180,000		$1,510,930,000		$1,232,330,000	

PRODUCTS METALLIC	1925 Quantity	1925 Value	1926 Quantity	1926 Value	1927 Quantity	1927 Value	Products
Pig iron (spot value), long tons	36,814,702	$739,316,333	38,181,053	$749,633,468	34,866,644	$646,226,139	Pig iron
Copper, sales value, pounds	1,674,869,886	237,832,000	1,739,622,094	243,547,000	1,684,040,983	220,609,000	Copper
Zinc, sales value, short tons	555,631	84,456,000	611,991	91,799,000	576,960	73,966,000	Zinc
Tin, short tons	14	15,980	8	10,400	27	34,600	Tin
Lead (ref.) sales value, short tons	654,921	113,956,000	680,685	108,910,000	668,320	84,208,000	Lead
Aluminum, pounds	*	36,430,000	*	37,583,000	*	39,266,000	Aluminum
Nickel, value at New York, short tons	272	169,664	323	234,558	860	390,740	Nickel
Quicksilver, value at S. Fran., flasks	9,174	762,616	7,642	702,323	11,276	1,314,782	Quicksilver
Antimonial lead, short tons (F.&D.)	19,667	3,785,547	22,524	3,916,714	24,347	3,277,043	Antim. Lead
Silver, commercial value, troy ounces	66,155,424	45,911,864	62,718,746	39,136,497	60,434,441	34,266,328	Silver
Gold, coining value, troy ounces	2,411,987	49,860,200	2,335,042	48,269,600	2,197,125	45,418,600	Gold
Platinum and allied metals, value at New York City, troy ounces	49,643	5.661,809	84,981	9,210,669	46,050	3,780,216	Platinum
Total value of metallic products (approximate) (b)		$1,380,280,000		$1,402,920,000		$1,217,000,000	

1928 ESTIMATED	Quantity	Value: Total	Value: Per Unit
Pig iron (spot value) long tons	38,000,000	$671,840,000	$17.68 ton (a)
Copper, sales value, short tons	1,060,000	315,880,000	14.90 c. lb. (c)
Zinc, sales value, short tons	620,000	75,863,200	6.118 c. lb. (d)
Tin (imports) long tons	79,000	79,717,320	50.454 c. lb.
Lead sales values, short tons	655,000	80,486,400	6.144 c. lb. (d)
Aluminum, short tons	90,000	43,740,000	24.30 c. lb.
Silver, troy ounces	56,000,000	32,578,560	58.176 c. oz.
Gold, troy ounces	2,194,295	45,360,100	$20.67 oz.

(a) Composite, from The Iron Age.
(b) Includes some items of minor interest to metal trades not shown in table.
(*) Bureau not at liberty to publish figures.
(c) New York. (d) E. St. Louis.

Supply Prices, January 14, 1929

ANODES

Copper:	Cast	26c. per lb.
	Rolled, oval	24¾c. per lb.
	Rolled, sheets, trimmed	25½c. per lb.
Brass:	Cast	25c. per lb.
Zinc:	Cast	12½c. per lb.

Nickel:	90-92%	**45c. per** lb.
	95-97%	**47c. per** lb.
	99%	**49c. per** lb.

Silver: Rolled silver anodes .999 fine are quoted from 61c. to 63c., Troy ounce, depending upon quantity.

FELT POLISHING WHEELS WHITE SPANISH

Diameter	Thickness	Under 100 lbs.	100 to 200 lbs.	Over 200 lbs.
10-12-14 & 16"	1" to 3"	$3.00/lb.	$2.75/lb.	$2.65/lb.
6-8 & Over 16	1 to 3	3.10	2.85	2.75
6 to 24	Under ½	4.25	4.00	3.90
6 to 24	½ to 1	4.00	3.75	3.65
6 to 24	Over 3	3.40	3.15	3.05
4 up to 6	¼ to 3	4.85	4.85	4.85
4 up to 6	Over 3	5.25	5.25	5.25
Under 4	¼ to 3	5.45	5.45	5.45
Under 4	Over 3	5.85	5.85	5.85

Grey Mexican Wheel deduct 10c per lb. from White Spanish prices.

COTTON BUFFS

Full Disc Open buffs, per 100 sections.

12" 20 ply 64/68 Unbleached	$29.65
14" 20 ply 64/68 Unbleached	38.20
12" 20 ply 80/92 Unbleached	32.45
14" 20 ply 80/92 Unbleached	44.00
12" 20 ply 84/92 Unbleached	42.50
14" 20 ply 84/92 Unbleached	57.60
12" 20 ply 80/84 Unbleached	38.35
14" 20 ply 80/84 Unbleached	52.00
Sewed Pieced Buffs, per lb., bleached	45-60c

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.14-.19
Acid—Boric (Boracic) Crystals	lb.	.08½
Chromic, 75 and 125 lb. drums	lb.	.20½-.21
Hydrochloric (Muriatic) Tech., 20°, Carboys	lb.	.02
Hydrochloric, C. P., 20 deg., carboys	lb.	.06
Hydrofluoric, 30%, bbls.	lb.	.08
Nitric, 36 deg., carboys	lb.	.06
Nitric, 42 deg., carboys	lb.	.07
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl	lb.	.17¼-21¾
Denatured, drums	gal.	.48-.56
Alum—Lump, Barrels	lb.	.03¼
Powdered, Barrels	lb.	.039
Aluminum sulphate, commercial tech	lb.	.02⅜
Aluminum chloride, solution in carboys	lb.	.06½
Ammonium—Sulphate, tech., bbls.	lb.	3.3
Sulhpocyanide	lb.	.65
Arsenic, white, kegs	lb.	.05
Asphaltum	lb.	.35
Benzol, pure	gal.	.60
Borax Crystals (Sodium Biborate), bbls	lb.	.04½
Calcium Carbonate (Precipitated Chalk)	lb.	.04
Carbon Bisulphide, Drums	lb.	.06
Chrome Green, bbls.	lb.	.28
Chromic Sulphate	lb.	.37
Copper—Acetate (Verdigris)	lb.	.23
Carbonate, bbls.	lb.	.16½-.17
Cyanide (100 lb. kegs)	lb.	.50
Sulphate, bbls.	lb.	.06¼
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.27
Crocus	lb.	.15
Dextrin	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluor-spar (Calcic fluoride)	ton	$70.00
Fusel Oil	gal.	$4.45
Gold Chloride	oz.	$14.00
Gum—Sandarac	lb.	.26
Shellac	lb.	.59-.61
Iron Sulphate (Copperas), bbl.	lb.	.01½
Lead Acetate (Sugar of Lead)	lb.	.13¼
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Nickel—Carbonate, dry, bbls.	lb.	.29
Chloride, bbls.	lb.	.18
Salts, single, 300 lb. bbls.	lb.	.13
Salts, double, 425 lb. bbls.	lb.	.13
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash, Caustic Electrolytic 88-92% broken, drums	lb.	.09
Potassium Bichromate, casks (crystals)	lb.	.09¼
Carbonate, 96-98%	lb.	.06¾-.07
Cyanide, 165 lb. cases, 94-96%	lb.	.57½
Pumice, ground, bbls.	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge, nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in casks	lb.	.05½
Silver Chloride, dry, 100 oz. lots	oz.	.46½
Cyanide (fluctuating)	oz.	.57-.60
Nitrate, 100 ounce lots	oz.	.40
Soda Ash, 58%, bbls.	lb.	.02½
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.18
Hyposulphite, kegs	lb.	.04
Nitrate, tech., bbls.	lb.	.04¾
Phosphate, tech., bbls.	lb.	.03¾
Silicate (Water Glass), bbls.	lb.	.02
Sulpho Cyanide	lb.	.32½
Sulphur (Brimstone), bbls.	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.39
Tripoli, Powdered	lb.	.03
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½-.06
Zinc, Carbonate, bbls.	lb.	.11
Chloride, casks	lb.	.06¾
Cyanide (100 lb. kegs)	lb.	.41
Sulphate, bbls.	lb.	.03¾